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A RECENT DISPATCH from Cape Town states that the South African colonies have agreed, in the rearrangement of their tariff schedules, to grant a 10 per cent reduction in favor of all imports from Great Britain. The same deduction is to be given on imports from such British colonies as may grant a similar drawback on the duties imposed by them. This concession is understood to be one of the results of Mr. Chamberlain's recent visit. It will give British manufacturers an important advantage in developing their trade in South Africa.

⚒

WE GIVE considerable space this week to some extracts from the report of the Anthracite Coal Strike Commission, an abstract of which was published in our issue of last week. The views of the Commission on the general subject of trades-unions and their conduct are so excellently and so clearly stated that they deserve careful reading. We think they well deserve the space we give them in the present issue, and that most of our readers will agree with us on this point, whether they accept the arguments of the Commission or not.

⚒

A NEW GOLD-FIELD has been opened up in the very heart of the desert lands which occupy the center of Australia. This gold-field is the Arltunga District, about 1,000 miles north of Adelaide and a little to the north of that part of the colony of South Australia, which lies nearest to the southwest corner of Queensland. Mr. H. Y. L. Brown, the government geologist, quotes high returns—ounces to the ton—from samples taken by him. The government has erected a small stamp-mill, which, in the latter half of 1902, treated 23 lots of ore, aggregating 424 tons, and yielding 741 oz. gold. This region is near the line of the proposed Trans-Australian Railroad, and a favorable development of the gold mines should stimulate the completion of that important undertaking.

RECENT EXPLORATIONS in the Antarctic region appear to demonstrate the existence of a large and elevated land area near the South Pole. This fact is of interest to mining men, because it carries with it the suggestion that mineral discoveries may result from further investigation. New Zealand and Australia, the nearest land masses, are eminently rich in metallic wealth. It is possible therefore that the geological conditions, which made them the scene of successful mining operations, may extend to the neighboring continent of the Antarctic. Cold and ice are obstacles less difficult to overcome than heat and fever, that is, provided an adequate expenditure in supplies and necessaries of life is made. The Klondike is healthier than West Africa. Therefore, it would not surprise us if the voyage of the *Discovery* became the forerunner of other expeditions, more utilitarian in their aim.

⚒

ALTHOUGH THE United States consumes more than one-third of the world's production of asphalt and bituminous rock, and in recent years has increased its demand fully 25 per cent, combinations in this industry have not proved a financial success. Two attempts at consolidating the leading properties in the United States, Venezuela and Trinidad have been made since 1899, and though the incorporations were capitalized at an attractive figure, they did not meet public approval and are now in the hands of receivers. The receivers report that the Asphalt Company of America, the first combination, has liabilities of $1,594,000 in excess of assets, and the National Asphalt Company, which controls the majority of the stock of the former and other concerns, had liabilities of $60,000 over assets. No dividends have been paid by either company, and owing to the competition between the subsidiary concerns and outsiders, profits are likely to continue small unless the surviving combination adjusts its capitalization to conform with actual earnings.

⚒

THE DISCUSSION of the impurities in commercial cyanide should prove useful. Several hundred tons of cyanide are consumed each month in the treatment of gold ores, so that the composition of this substance is a matter of considerable practical importance. The introduction of the mixture of sodium cyanide and potassium cyanide, in 1892, resulted in creating a fictitious price as based upon the composition of potassium cyanide, which, as then used, contained only about 70 per cent cyanogen. The lesser atomic weight of sodium accounted for an increase in percentage of cyanogen as based upon potassium cyanide and led to misleading statements. The manufacture of a pure sodium cyanide, with 128 per cent of cyanogen, as expressed in terms of potassium cyanide, has further rendered it desirable for operators to know just what material they are using, since the sodium cyanide requires the addition of more alkali to the mill solutions. The nitrate of silver test has become useless without a determination of the proportion of sodium to potassium—a determination which is one requiring delicate chemical manipulation. Therefore, in

purchasing commercial cyanide it is advisable to insist upon a statement of the proportion of the two alkaline metals present.

⚒

The report of the Tamarack Mining Company, which is given on another page, shows that the increased cost of fuel and supplies, which prevailed through the past year, was sufficient to absorb all profit at the low prices of copper. The company's copper brought an average of 11.87 cents per pound, which was increased to 12.17 cents by interest and miscellaneous earnings. The cost of production, however—including the construction and exploration, which are necessary parts of the work of the mine—was 11.90 cents. This seems rather a high figure, but there is no reason to suppose that the mine was not carefully and economically worked under Capt. Parnall's management. Evidently the Tamarack must depend upon a higher price of the metal for its future profits. The recovery of copper from the rock stamped was a trifle over 1 per cent, or somewhat greater than in several mines, whose reports we have recently published; but this was lower than the Tamarack has made in past years. The report—for the first time in the history of the company—gives full particulars of production, operation and costs. This is what we have always urged as only just to stockholders; and it gives us much pleasure to see that their right to full information has been thus acknowledged.

⚒

While from the metallurgical side the Dominion Steel Company has been quite as successful, so far, as could have been anticipated, its stock has unfortunately been made a speculative football in the Montreal and Boston markets. The quotations have varied very widely from time to time, and the stock has been the subject of several "corners" and "deals," which have created quite a sensation on the exchanges. Recently the prices were pushed to a high point, and the reaction which has now taken place has brought them down to a price which appears entirely too low. The company has properties of great value, which are well placed, not only for operation at moderate cost, but for commanding the Canadian market, and for taking advantage of any special demand which may arise either in Europe or the United States. Both for home and foreign trade its position could hardly be better. There have been many rumors of mistakes in constructing the plant, but these appear to have had little foundation in fact, and to have been circulated chiefly for stock-jobbing purposes. For the sake of the company itself, it is to be hoped that it will soon cease to be a speculative property and that it will take the position to which its real value appears to entitle it.

⚒

A press dispatch from British Columbia reports that the strike of the miners in the Crow's Nest Pass coal-fields, in that Province, is at an end, although the terms of settlement are not fully given. Should the dispatch be true, it is a matter of importance to the smelters and other industries of British Columbia, some of which are largely dependent on the coal and coke from these mines for their supply. The opening of this coal-field is comparatively recent, but the companies operating in it have had many difficulties to contend with. The fatal accident last year was followed by long continued strikes, which have embarrassed production for the greater part of the year, and caused great losses to the coal companies.

The Crow's Nest Pass mines were opened in a region which, at the time, had very few inhabitants, and miners were brought there from various quarters. From all accounts, this labor included many turbulent and troublesome elements, and the constant difficulties which have existed might reasonably have been anticipated. It is to be hoped that as the mines are developed a better class of labor will be introduced, and that the operation of the field will be attended with less difficulty hereafter than it has been in the past.

⚒

We publish elsewhere a valuable article on the engineering problems arising out of hoisting from great depths. Professor Peele's contribution to the discussion, which has lately stirred our friends at Johannesburg, will be read with interest. Further comment from engineers, especially those who have had experience in the Lake Superior region or in the Butte district, would be opportune, as the subject is one which commends itself to careful enquiry both on theoretical and practical grounds. Mr. Hans C. Behr has replied to the criticisms of Messrs. Jennings and Robeson, so that in an early issue we hope to reproduce his concluding remarks, as made before the South African Association of Engineers. It is unlikely that the two groups of engineers who have been in opposition in their views, regarding tail ropes and stage winding, as applied to operations at 6,000 ft. and deeper, will alter the plans already formed for installations on the Rand, but those who are not committed to one or the other point of view will have learnt much from the elaborate and skilful statements of facts and figures. Discussions of this kind, carried on in good spirit and by well informed men, are always a distinct gain to the profession at large, and it is not too much to say that Messrs. Behr, Jennings, Robeson, Webb and Peele have won the cordial appreciation of their professional brethren.

⚒

MINING RISKS.

Actuarial calculations have been successfully adopted in estimating the value of the mines on the Rand. Such a method of appraising mining property may not be applicable to the palpitating uncertainties of ordinary gold veins, which, while they miss the comparative uniformity of the great Main Reef series, yet possess possibilities of bonanzas, the like of which are unknown at Johannesburg. Nevertheless, the introduction of the actuary into the proverbial uncertainties of mining would have seemed a curious departure twenty years ago, and it carries with it a certain suggestiveness which can be expressed by simile.

Mines are comparable to humanity. The new discovery of a prospector is like an infant, born today, which may die to-morrow, leaving no record, not even a name. A prospect resembles a young child rich in possibilities, but hedged around with all the uncertainties of immaturity. The promising prospect may succumb to the measles of bad management, or the whooping-cough of inexperience. In spite of care and equipment neither child nor prospect may survive long enough to make a mark, or, on the other hand, they may outlive the dangers of adolescence and, by reason of inherent quality, they may develop into a mine or a man which outdistance the expectation of their best friends. Again, a child grows to manhood, a prospect develops into a mine. The young man reaches the threshold of a career full of promise and distinction, or, he already manifests the evidence of an early decadence of great natural powers; so, too, the prospect, having passed through the changes of early development, may afford proof of opening up into a property of importance, or, on the contrary, it may have been deepened to the water level only to disclose the fact that either the sulphide ores are less rich than the oxidized product near the surface, or that the material, hitherto docile to simple milling, has become too refractory for profitable treatment. Another stage of development brings the man to full maturity with a past of fair achievement and a future of continued usefulness or, it may exhibit the exhausted energies of a waning career; similarly, the mine, having achieved celebrity by means of a prolific production, gives assurance of continued productiveness, or, it may be, already shows signs of approaching impoverishment. Finally, both become old, the man and the mine; and, whether it be long in years or deep in feet, we predict with certainty the eventual exhaustion of splendid powers. Men think all men mortal but themselves; they also realize that all mines must give out at length—all save their own. Thus does the melancholy actuary drive home his sad philosophy.

⚒

THE CHEMISTRY OF ORE DEPOSITS.

Students of the origin of ores will be glad to read Dr. Walter P. Jenney's paper entitled "The Chemistry of Ore Deposition," an abstract from which we publish in this issue. Dr. Jenney gives a table of the comparative reducing powers of de-oxidizing agents, the value of which will be keenly appreciated. The reducing action of carbonaceous matter has been recognized in the lead and zinc deposits of southwestern Missouri, in the Wood River District of Idaho, in the classic region around Freiberg, at the Silver Islet Mine, on Lake Superior, in the ore-deposits of Newman Hill, at Rico, in Colorado, in connection with the Indicator vein, at Ballarat, Victoria, and in the mines of Gympie, Queensland, as well as numerous other localities not so well known. Therefore, this review of a very suggestive question, at the hands of so competent an authority, is sure to provoke attention and discussion. The occurrence of carbon dioxide in a liquid form within the cavities of quartz, found in rocks of igneous origin, such as granite; the emanations of the same gas during the quiescent stage of volcanic action; the occurrence of petroleum in the quicksilver mines of California, that of bitumen in the Joplin region, that of graphite in the Black Hills, that of organic matter in the limestone at Tintic—these are all facts which, when connected and discussed in their relation to each other, assume a significance which cannot be disregarded in any comprehensive attempt to explain the obscure causes which have determined the distribution of ores.

The recent accentuation of igneous action as a

factor among the ore-forming agencies and the discussion of magmatic differentiation, as affecting the origin of ores, have opened up a fresh field for conjecture. These late views of the general problem can be connected indirectly with the study of the action of carbonaceous matter, as a reducing agent, now reviewed by Dr. Jenney, through the imputation of a volcanic origin to petroleum and natural gas, as advocated in a recent paper by Mr. Eugène Coste. Thus points of view which are seemingly far apart may eventually be found to throw a light on the same part of the general field of research.

Ore formation is a phenomenon—that is, an appearance requiring explanation—which covers so wide an area of observation in time and place, and, as far as we can see, is affected by such a multiplicity of conditions, that while we may be able to postulate the principal factors in the work of depositing ore we can never state which was the decisive agent. We may be able to find out the part which each factor played without being able to say what particular condition, chemical or physical, brought about the culminating process of precipitation. Similarly, all the factors favorable to ore-formation may be present save one, and the absence of that particular one may produce a sterile tract of rock; they may be all on hand at various periods, but not simultaneously, so that no benefitiation of the rock ensues. Thermal, chemical and structural conditions must co-operate until that delicate balance is produced by virtue of which mineral solutions put down their precious freight. For these reasons we welcome Dr. Jenney's investigation of one branch of the subject and commend it to the consideration of our readers.

⚒

THE UNION OF NON-UNION LABOR.

An important feature of the report of the Anthracite Commission is that part of it which discourses in plain terms of the rights of a majority to dictate to a minority, in the manner recently arrogated by the United Mine Workers. The commissioners state in plain language that operators and workmen alike are amenable to the laws, national and State, under which they live and labor; they have done a service to the community in emphasizing the fact that no organization, whether of employers or employed, has any right to compel those who are not members of it to fall in with its decisions, and that the majority as such is quite in the wrong, legally, in any attempt to set up an *imperium in imperio*, a rule separate from that of the authority of the State itself. This decisive opinion will be appreciated. It comes at an opportune moment. Non-union laborers are organizing. We wish them success. They represent that feature of the labor problem which arouses our keenest sympathy, because they stand for a principle dear to every man who values freedom and not the mere name of it.

The organization of street-railroad men at San Francisco has made certain outrageous demands upon the trolley companies of that city, one demand being that promotion shall only be made by the seniority rule; so that efficiency, honesty, heroism are all to count as nothing, and every workman is to be brought to the one deal level at which the dial of Time alone shall measure a man's value. This is the veritable apotheosis of mediocrity. May it fail, always, everywhere. As a consequence of this last attempt of misguided Socialism, great interest is being taken in an organization started last week at Indianapolis. It is a union of non-union men. This is not the first effort of the kind, for something similar was started a few months ago in Harlem. The new union purposes the consolidation of the men who oppose some of the prevailing methods of trades-unions, especially the tyranny of the walking delegate, and the restriction of individual freedom to make terms with employers. It is time the independent workmen made themselves heard, instead of being merely a convenient tool in the struggle between organized capital and trades-unionism. The new movement represents a withdrawal of the law-abiding workman from the lawless, a separation of those who want to better their status by proper methods from those who adopt an un-American Socialism which mistakes license for liberty.

While it is apparent that mere opposition to the ways of existing trades-unions cannot suffice as a firm basis for organization, we trust that the honorable sentiment which is voiced by this new departure will crystallize eventually into a body of public opinion which shall aid the non-union men in their effort for freedom of action. At present they are ground between the upper and nether millstone; they receive sympathy from the public during a strike, and when they come forward to keep the industrial machinery at work, but they are forgotten as soon as the companies and the trades-unions arrive at a settlement. In spite of it all, they stand for a principle—that a man shall be allowed to earn his daily bread in his own way, so long as he recognizes the law of the land. As against this we have the creed of the labor agitator that "a man who works during a strike has no moral right to work if his work destroys the hopes and aspirations of his fellow-man"—a doctrine as undemocratic, immoral and un-American as ever vain rhetoric and sloppy sentiment joined forces in producing. The union of non-union labor is a sign of the times. May it prove the omen of better days for the intelligent working man.

⚒

MARCH DIVIDENDS.

Forty-seven companies identified with the mineral industry of the United States paid $27,308,103 in dividends during March. This is the largest monthly total reported for a year past, and shows a marked increase as compared with March, 1902, when the high record was reached. Adding the dividends paid in January and February there is a grand total, for the first quarter of this year, amounting to $45,604,706, of which the greater part has been contributed by the industrial combinations. The payments in the corresponding quarter of 1902 amounted to $48,059,673, showing a decrease in 1903 of $2,454,967, as a result of smaller dividends by gold, silver and copper mines which have had to contend with a low metal market. An improvement is now expected, however, as the more important commercial metals, like copper, silver and lead, have recently advanced in price in consequence of better trade conditions.

Of the $27,308,103 paid in March, the Standard Oil Company furnished $19,400,000 as a quarterly dividend of 20 per cent, and the United States Steel Corporation, $5,085,257 as a 1 per cent quarterly payment on its common stock. These two consolidations pay the largest dividends of any industrial enterprises in the world, and while Standard Oil shares are held by comparatively few, those of the United States Steel Corporation are distributed among thousands of investors.

Two Michigan copper properties supplied nearly one-half of the $1,713,865 paid by 28 metal mines. The Calumet & Hecla Copper Company disbursed $500,000 as a quarterly dividend of $5 per share, or 20 per cent on a par of $25. Since incorporation this mine has yielded in dividends $80,350,000 on a capitalization of $2,500,000. The Trimountain Company, which was organized in 1899, declared its first quarterly dividend of $1.50 per share, or 6 per cent on a capital of $2,500,000.

Twenty-five companies owning gold, silver and lead mines, in seven different States, principally Utah and Colorado, have declared dividends of $1,062,899 during the month. These dividends have been at the annual rate of 3 to 40 per cent. The National Lead Company, operating lead mines in Missouri and manufacturing pigments, etc., has paid $260,820 as a 1¾ per cent quarterly dividend on $14,904,000 preferred stock. This stock has yielded so far $13,187,708, while the holders of the $14,905,400 outstanding common shares have received only $1,341,486 in dividends. The best paying gold mine in March was the Camp Bird, of Ouray, Colorado, which is controlled by a British company, and is disbursing quarterly dividends of $110,700, or at the rate of 12½ per cent per annum. Other large payers have been Daly West and Silver King, both in Utah, which divide profits regularly every month, at the rate of 36 and 40 per cent per annum, respectively, on a par value of $20. South Swansea, in the same State, has paid the final installment of $9,000, or 6c. per share, on account of dividend No. 21, which was declared by the old company early in 1901. Grand Central, also in Utah, has resumed dividend payments of 10c. per share, equivalent to $25,000, making a total to date of $656,250 on a capitalization of $250,000. This company's dividends were interrupted in 1900 by the trespass suit with the owners of the Mammoth Mine.

Industrial dividends amounted to $25,594,204 in March, of which the Standard Oil Company and United States Steel Corporation supplied $24,485,257. Eight California oil companies paid $72,327, mostly in regular dividends at rates varying from 12 to 24 per cent per annum on capitalizations of from $208,700 to $1,000,000. The Home Oil Company, operating in Fresno County, California, pays monthly dividends of 7½c. per share, which is at the rate of 90 per cent annually on $100,000 capital. Two natural gas companies in Ohio and Pennsylvania paid $189,959 as quarterly dividends of 1 per cent on $100 par, and 1¼ per cent on $50 par.

Iron and steel dividends were $5,317,757, chiefly from the steel combination, as noted above.

Three coal and coke companies disbursed $152,727, which were dividends at the rate of 7 to 10 per cent per annum on $2,500,000 to $1,500,000 capital stock.

In the miscellaneous list the Virginia-Carolina Chemical Company leads with $349,805 as a 1¼ per cent quarterly dividend on its common stock. The General Chemical Company has increased its common quarterly dividend from 1 to 1¼ per cent, amounting to $92,629, and making total payments,

to date, of $1,022,650, which is equal to 13¼ per cent. This company is also paying 6 per cent annually on its preferred stock.

In addition to the above 11 Mexican mines and metallurgical works have paid $69,998, and one Central American gold mine, owned in New York, $15,000.

⚒

MARKET CONDITIONS.

The metal markets continue very strong, with the same conditions of active demands that we have heretofore noted. Consumption in all quarters continues very large and there is apparently no present tendency to a decrease.

The copper market continues strong, but with no further advance in prices. Spot metal remains scarce and producers' supplies are very well taken up for some time to come. Consumers are calling urgently for deliveries, which, in a number of cases, they will not be able to secure. Consumption undoubtedly continues on a very large scale. In the London market there have been some sharp fluctuations, chiefly speculative, the meaning of which is not altogether clear. It is quite possible that this movement is intended for the purpose of forcing down prices on this side, but conditions here are such that such a result is hardly practicable.

Tin continues to fluctuate, as we have heretofore noted, but demand is strong and consumption very good.

Lead is also showing more strength. While there has been no change in prices, the demand for metal is unusually large, and consumers find difficulty in getting their supplies in time.

Spelter is also strong, both galvanizers and brass makers continuing free buyers; while the supply of spot is small, some concessions are made on futures.

Silver has lost nothing but remains about the same. Buying for India is reported a little better. The Secretary of the Treasury, on March 30, purchased for account of Philippine coinage, authorized by the recent law, a total of 350,000 oz. of silver, at an average of 49.8c. per oz., the metal to be delivered in equal parts at the mints in Philadelphia and San Francisco.

The iron market continues unchanged, except that there has been an increased buying for delivery in the last quarter of the year. For the third quarter, capacity is largely taken up already. The hesitation which was apparent a month or so ago seems to have passed off, and buyers are anxious to place their contracts as soon as possible.

There seems to be little doubt that the United States Steel Corporation has closed the deal for the taking over of the entire interests of the Jones & Laughlin Steel Company. There has been no official announcement by the Corporation and the officers of the Jones & Laughlin concern continue to make denials that a sale has been or will be made. There are indications, however, that the deal has been consummated, though positive information is withheld. The proposed purchase of the Clairton plant by the Steel Corporation seems to be tied up pretty tight. The stockholders of the Crucible Steel Company of America, which embraces a lot of old plants, are reluctant to give up the best thing they have—the Clairton modern steel plant, three up-to-date blast furnaces and valuable ore and coal lands.

The Western coal markets are quieter, so far as local consumption is concerned. Domestic demand is, of course, falling off, and manufacturers appear to be better supplied. There is still a good deal of discussion going on over contracts for the Lake trade, although coal is being delivered at the Lake ports quite freely and the first vessels will probably start very soon; some are already loaded.

In the Atlantic seaboard bituminous trade there is a little more activity. Contracts for the new year are being closed with the better grades of steam coal in most demand. Producers of specialties have already taken about all the contracts they care for. Though the labor outlook is still unsettled, there is no immediate prospect of a general strike, since the United Mine Workers, after their failure to gain anything in the several districts last year, are not in a hurry to renew the fight this spring. The real question of the dispute is not wages or hours of work, but recognition of the Union. The increased wages granted in Central Pennsylvania and other fields, indicate considerably higher prices for coal this year.

In the anthracite trade business has been very dull for several weeks, although great activity is expected now that the companies have announced their spring prices, which are on a basis of $4.50 for egg, stove and chestnut sizes of free-burning white ash, f. o. b. New York harbor shipping ports. The early opening of Lake navigation is expected to relieve the heavy shipments to upper Lake ports, where supplies are very low indeed.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

"Metallics" is the term applied to those bits of ductile metal (usually native gold, silver or one of the malleable sulphides) which do not pass through the sieve of the assayer, in that process of final pulverization which the pulp undergoes before being weighed for the crucible.

Truly it has been said, that to a clear eye the smallest fact is a window through which the Infinite may be seen.

There is no study better fitted than that of geology to impress upon men of general culture that conviction of the unbroken sequence of the order of natural phenomena, throughout the duration of the universe, which is the great, and perhaps the most important, effect of the increase of natural knowledge.

It should never be forgotten that what we call "catastrophes" are, in relation to the earth, changes, the equivalents of which would be well represented by the development of a few pimples, or the scratch of a pin, on a man's head.

There is a prevalent idea that the constructive genius is in itself something grander than the critical, even though the former turns out to have merely made a symmetrical rubbish heap in the middle of the road of science, which the latter has to clear away before anybody can get forward.

The causes which have combined to cast a single grain of sand upon the shore are infinite, and the infinite can neither be surpassed nor understood. We cannot understand what it is or how it comes to be where it lies, and yet we can make geology useful. Also it is a maxim of science that results are obtained by approximation through error, and that the truths of one generation are the errors of the next.

The shipments of sulphur from Sicily amounted in 1902 to 467,319 tons, as compared with 459,030 tons in 1901 and 557,668 tons in 1900.

During the past seventeen and a half years the Broken Hill Proprietary Mine has yielded 117,062,738 oz. of silver, worth approximately $72,500,000, and 565,089 tons of lead, worth about $33,750,000. Several million tons of zinc ore, which have been raised, are stacked for treatment when a suitable opportunity occurs. The tests recently made by the newly-patented Delprat-Carmichael process appear to show that the zinc problem has been solved.

The reputation of the Transvaal as a mining region is associated almost solely with gold, but there are two silver mines in that region, and it must be remembered that every ounce of gold produced on the Rand contains an average of about 10 per cent of silver.

At Dolcoath, the premier tin mine of Cornwall, with an average produce of 38.28 lbs. of black tin per ton of ore, it costs, roughly, $295 to produce one ton of black tin. This includes the dues paid to the owner of the land, which in this case amount to no less than $24, or nearly 8 per cent on actual working costs.

In the eighteenth century a large proportion of the metal mines of France, and Western Europe generally, were directed by Saxon engineers, of whom Schreiber was chief. In the nineteenth century they lost their vogue and were replaced by Cornish mine-captains.

In the fourteenth century the coal was mined by the shaft and adit method. The miners used wooden picks tipped with iron, and loaded the coal by means of wooden shovels on to wooden sledges, and transported it by manual labor to the shaft bottom. Here it was carried on the backs of women to the surface, or raised by a jack-roll or common winch, worked by hand. Mines were abandoned when difficulties arose, occasioned by lack of air and excess of water, and fresh pits were sunk. Old shafts may be seen in ancient mining districts in almost every field, the area to each shaft being 10 to 11 acres.

In the early part of the seventeenth century attempts were made in Staffordshire by Simon Sturtevant and John Ravenson to make iron with pit coal, but failed. However, in 1619, Dud Dudley, owing to the scarcity round his works of wood for charcoal, conceived the idea of utilizing coal, and so altered his furnace that at his first trial he successfully made iron at the rate of 3 tons per week. The gradual utilization of this kind of fuel for smelting iron tended greatly to the development of coal mining.

The following description of the early recognition of the danger due to firedamp and the first methods adopted to overcome it, are from a paper by Roger Mostyn, read before the Royal Society in 1677. In the opening of a new colliery at Mostyn in 1675, firedamp was first heard of in that district. The writer tells how that often, after they had gone a good distance underground, and were in want of air, the firedamp gradually began to "breed." At first the workmen played with it, toying with it with their lighted candles, until one morning "the first collier that went down, going forward in the witchet with his candle in his hand, the damp presently darted out violently at his candle, that it struck the man clean down, singed all his hair and clothes, and disabled him from working hereafter." After this the colliers selected one of their number, who—being a resolute man of purpose—was sent down the mine some time before them every morning, and who, clothed in his worst rags, saturated with water, used to crawl forward towards where the firedamp existed, holding a long pole before him with one or more lighted candles at its end, and thus exploded the firedamp. This courageous individual was named the "fireman," a name which still adheres to those men who at the present day examine the working places before the men go to work, to see that they are safe. This presently became the usual mode of dealing with firedamp—a very dangerous mode.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

WIDTH OF FURNACE RELATIVE TO TONNAGE IN COPPER BLAST-FURNACE PRACTICE.

To the Editor:

Sir.—The interesting article by Mr. Van Liew in your issue of the 21st, touches upon a point in smelting practice of vital interest to practical men. The question, "How wide should a blast furnace be to treat a certain ore?" is not so readily answered, nor will mere reference to the workings of other furnaces always be a safe guide. The quality of the ore to be smelted and the results to be obtained must be considered and the furnace should conform to these. The different furnaces mentioned by Mr. Van Liew are handling very different materials, thus: In Montana the material is crude ore, coarse in size, very siliceous, carrying 12 to 15 per cent sulphur. The fluxes are either coarse concentrates or coarse iron ore, and coarse limestone. Briquetted material is included. This charge produces a very siliceous slag and matte of converter grade. In British Columbia, Mr. Johnson has been smelting a crude ore consisting chiefly of metamorphosed limestone (containing garnet, epidote, etc.) with much magnetite and very small amounts of sulphides, so that there is no sulphur to be eliminated; the ore is a "natural flux." Moreover, it is broken in surface quarries and arrives at the smelter in large, coarse pieces, ideal for blast furnace work.

In Tennessee, Mr. Channing is smelting a heap-roasted pyrrhotite, which is low in silica, requiring the addition of quartz for good slag results. This material again is in large pieces, porous from the roasting operation, and in most excellent condition for the blast furnace. Here again the amount of sulphur to be driven off in the furnace is considerable. The slag is naturally an irony one, but the resulting matte is of converter grade.

At the Globe plant, in Arizona, the regular work of the furnace has evidently been the production of black copper from oxidized ores, and the test made by Mr. Van Liew was for the purpose of producing matte instead. It is evident from the context that the amount of sulphides used in this 5-day run was no more than necessary to cover the copper and produce matte, therefore no sulphur to speak of would have been driven off. I do not know the conditions as to the size of ore particles when fed to furnace.

If instead of the conditions described we consider an ore which contains 35 per cent sulphur (as pyrite), which breaks in the mine so fine that it resembles concentrates (60 per cent will pass a 34-in. screen), and carries silica sufficient to flux the iron; under *such* conditions, what width of furnace should I use? The data given by Mr. Van Liew do not help me, as the conditions are not similar to any of those cited. We cannot heap roast; and mechanical roasting will necessitate briquetting, which we desire to avoid.

It is obvious that to charge such fine material into a blast furnace 56 in. in width, will result in a very heavy body of material, through which the blast will penetrate with difficulty and necessitate a high pressure. This will result in the formation of "blow-holes" and all the attendant troubles, known to the practiced blast-furnace man, with the production of immense quantities of flue dust and flue losses. Furthermore, high pressure is the surest agent towards reducing action in the furnace, but in this very case we desire oxidizing action, or our matte will be too low in grade! Therefore, *such conditions*, more than the question of buildings or of previous records, must govern our choice of furnace width.

I do not think that the data given by Mr. Van Liew warrant the deduction that a narrow furnace will always smelt more tons per square foot of hearth area; the physical conditions of the ore charge and its chemical contents must be largely factors in the final result. Thus, for the Old Dominion ores making black copper I should choose a round or elliptical furnace, for the porous Tennessee ores, any length and width which my blast would penetrate, in Butte not over 45 ins. in width, and for the fine sulphides mentioned above not over 42 ins., with a preference for less.

JAMES W. NEILL.

Salt Lake City, Utah, March 26, 1903.

TONNAGE IN COPPER BLAST-FURNACE SMELTING.

To the Editor:

Sir.—A number of interesting articles on the above subject have appeared recently in the ENGINEERING AND MINING JOURNAL, and doubtless all metallurgists are interested in the publication of the results obtained at different smelters. I have received a number of letters in reply to my communication published July 26, 1902, and in response to requests for further and more recent information, give the following record of the work done at the Tennessee Copper Company's smelter during the month of February, 1903. Two furnaces were in blast for 28 days, and smelted as follows:

	Tons.
Total charge smelted, not including coke.....	30,095
Total ore smelted	26,757
Total coke used	3,269
Charge smelted per day for entire month.....	1,074
Charge smelted per day per furnace	537

The average slag analysis for the month was: Insoluble, 31.22 per cent; FeO, 51.39; Cu, 0.44. The remainder is mostly alumina. Our ores contain little lime, and we are compelled to use quartz to flux the large excess of iron. On account of the high specific gravity of these irony slags they carry away more copper than they would if part of the iron were replaced with lime, which would make not only a more fusible, but a lighter slag. The average number of men and boys employed in the blast furnace department, per day of 24 hours, is 54, making an average of about 20 tons per day smelted for each man employed. The cost of smelting was given in detail in the ENGINEERING AND MINING JOURNAL of February 14, 1903, being $1.05 per ton of ore for the entire year 1902. Last month, notwithstanding coke has increased in cost, the smelting cost was under that figure.

Following is a summary of the figures given in the recent articles published on blast furnace smelting tonnages:

Name of Smelter.	Authority.	Size of furnace.	Area at Tuyeres.	Tons per day.	Tons per sq. ft. of area.
Tenn. Copper Co. (Feb., '03).....		56x180	70 sq. ft.	536	7.65
"Two Montana Plants"	W. R. VanLiew	56x180	70 sq. ft.	420	6.
Granby, B. C. (Dec. '01)	E. Jacobs	44x160	49.5 sq. ft.	354	7.1
B. C. Copper Co. (Jan. '02)	P. Johnson	42x150	43.7 sq. ft.	428	9.8
Old Dominion (5 days)	W. R. VanLiew	35x122	29.68 sq. ft.	295	9.9

Mr. W. R. Van Liew, in an interesting article on "Width of Furnace Relative to Tonnage," published in the ENGINEERING AND MINING JOURNAL of March 21, 1903, states that "tonnage smelted per square foot of hearth area at the tuyeres is the only true standard by which to gauge, or compare, the workings of different types of furnace." If we adopt this standard the above table shows the results to be in favor of the smaller furnaces, not because they smelt more tons at a given cost, but because they have a smaller divisor. The standard I would use in comparing different types of furnaces would be their relative economy. As conditions vary at every smelter, the size of furnace that is most economical must be determined by actual experiment. Tonnage is only one of the elements to be considered, but so far the experience in copper, as in iron, smelting appears to indicate that the large furnaces are more economical.

I cannot agree with the two writers who have recently mentioned the advantages of hand feeding over mechanical feeding. A proper system of mechanical feed has proved so much more economical than hand feeding that it is, in my opinion, merely a question of time when it will be used on all large furnaces. Regarding the claim that mechanical feeding produces stoppages due to irregularities in the running of the furnace I would state that the last campaign of our No. 1 furnace lasted 6 months 18 days, during which time the furnace did not lose a single shift, and smelted 98,886 tons of material, not including coke, all of which was fed mechanically.

WILLIAM A. HEYWOOD.

Copperhill, Tenn., March 24, 1903.

SAMPLING AND ESTIMATION OF ORE IN A MINE.

To the Editor:

Sir.—At the risk of repeating some of the rules and requirements laid down by Mr. T. A. Rickard in a series of admirable papers upon the subject of mine sampling and ore estimation, may it be permitted to one who knows something of the arduous task and laborious detail of mine sampling, to take a part in the discussion of this interesting subject?

To attempt some formulation of the rules and principles which constitute, more or less, the safeguards against the error which so easily creeps into the practice of sampling and the calculation of ore based on such sampling, despite all care and precaution, I would make the following suggestions:

1. Do not commence the regular sampling of any mine until you are familiar, in a general way, with the vein or veins of the mine under examination. Begin with a preliminary sampling. This preliminary work is necessary to determine the scheme of sampling, i. e., to ascertain whether the ores of that particular mine admit of differentiation into milling, shipping, and low grade.

2. Employ trustworthy, conscientious assistants and steer clear of local mine help. One local miner, preferably an old employee of the mine under examination, is enough. Such a man will sometimes unknowingly contribute much useful information connected with the past and present operation of the mine.

3. Put your samplers to work in pairs in such a way that they will alternate the sampling, one couple taking the odd numbers and the other the even numbers. This makes it easier to keep sample numbers straight and quickly places the responsibility for any irregularity that may come up in the sampling.

4. Work as near as practicable to a uniform width of sample cut. This way affords natural compensation in that the wider the vein the bigger will the resulting sample be, and the smaller the vein the smaller the sample. An average sample of 35 to 40 lbs. is usually enough for all practical purposes. Put in extra waste samples as a check on the assayer and to catch any possible tampering with samples.

5. Mark and distinctly designate every point of sampling, so that it can be found for later reference and re-sampling should the assay indicate a discrepancy or glaring irregularity. When such sample point coincides with a rich streak, or druse, or cavity, it should be distinctly noted for separate consideration. The habit of throwing out high samples is a sloppy procedure. Where the assaying must be done away from the premises and re-sampling is not convenient, control samples should govern.

6. Reduce as early as possible the bulk of the samples taken.

7. Employ your own men to quarter down as the sampling progresses and quarter down on canvas in the mine (observing fit proportion between size of fragments and bulk of sample) to sealed sack sam-

ple about 1½ lbs., and use the "split" on the final quartering, to insure regular proportion of coarse ore and fines. Any further reduction should be made in the assay office. The use of a screen in sampling is not to be recommended, in that the chances for error increase with every additional tool introduced.

8. Avoid any big accumulation of samples, even though it is not possible to do the assaying on the premises.

9. Old stopes are almost always deceptive in point of ore produced in relation to space showing. Beware of false impressions in this regard.

10. A small number of carefully taken samples is better than a great number of careless samplings. Aim to be thorough in the work.

11. It is well, and even important, to have the privilege of doing any work that you may deem necessary to prove up a doubtful point of development in the mine.

12. The sampling completed and the data and maps brought up to conform, there remains to consider the factor of safety. This is a consideration subsequent to sampling of a mine, but nevertheless of no small importance in the estimation of ore in reserve. It is, and always will be, a varying factor among mining engineers, but, whether larger or smaller, should not be neglected. It must be taken into account to offset the fact that it is not possible to mine as clean as it is to break the sample, and in that mining itself is a more wasteful process than is generally admitted. In the aggregate, the sampling of mines leans decidedly toward over-estimation, and this fact argues the lack of anything like an adequate recognition of the losses that are inevitable in waste, in sorting in the mine, and in the ore house. A factor of safety of from 10 per cent to 20 per cent is admissible, according to the nature of the vein, character of the ore, and general mining conditions.

Sampler.

Denver, Colo., March 17, 1903.

CONCRETE MORTAR BLOCKS FOR STAMP MILLS.

To the Editor:

Sir.—I have been much interested in recent communications I have seen on the question of concrete mortar blocks for stamp batteries.

It may seem superfluous to add anything to Mr. Boss' remarks on this subject, as he has had, without doubt, more experience than any one else in the construction of these mortar blocks—or, rather, foundations, as he more properly calls them—as well as the advantage of an observation of results extending over a longer period. However, since the writer was employed on the construction of the new Hacienda San Francisco, referred to in Mr. Boss' letter, this matter has been one of great interest, and the splendid results obtained in this mill, led to my unreserved conversion and consistent advocacy of this great improvement in mill construction.

Too great stress, however, cannot be laid on the main points covered in Mr. Boss' communication, particularly on his recommendation that the foundation should be solid, and not cut into for the accommodation of the traditional sills for the battery posts. This is the only defect in the mill on the property I am operating here, and as it is, it seems unlikely that trouble will ever be experienced from the failure of the mortar blocks. This mill has twenty 1,080-lb. stamps, and each mortar is set on a separate concrete block, having the posts extended down to the sills, which are set in the ordinary manner. The mortars weigh about 6,500 lbs., and are provided with an extra wide base, designed for the concrete blocks, but the battery would certainly be a better example of design if the posts had terminated at the top of the concrete foundation, and if the mortars were set on a block extending under the whole twenty stamps.

At the North Star Mine, at Grass Valley, Cal., Mr. A. D. Foote, the manager, replaced the old wooden mortar blocks under his 40 stamps, some years ago, with solid masonry blocks, one for each of his batteries of 20 stamps. The battery posts were cut off, somewhat above the top of the foundation, and fitted into cast iron foot-sockets, which were bolted in turn to the foundation. Although Mr. Foote knew nothing at that time of the foundations built by Mr. Boss, by a rather remarkable similarity of reasoning, he arrived at the same conclusion, and made a foundation almost exactly the same as that at the Hacienda San Francisco, in Pachuca, even to the manner of securing the bottom of the posts to the foundation. Mr. Foote, however, employed rubble masonry laid in cement mortar instead of concrete, and added caps of cut granite, upon which were placed his mortars, which were not designed for anything but the ordinary wood block.

At the time that the writer examined these foundations, they had been in operation for some time, and were a perfect success in every way, and it is the writer's opinion that the question of the value and permanence of the concrete foundation for mortars is beyond any question, when the foundation is properly designed and built; but the substitution of concrete for wood, retaining the stereotyped form of battery frame, and ignoring the advantage to be derived from the large mass as employed by Mr. Boss and Mr. Foote, is very likely to result in trouble. The writer believes that all failures recorded will be found, on investigation, to be due entirely to improper design of mortar and foundation, or faulty material. The example shown in the North Star mill makes it plain that with proper care mortars of the ordinary proportions of base may be successfully used in case of necessity.

George S. Binckley.

Cedros Island, Lower Cal., March 18, 1903.

THE HUNT LEACHING PROCESS.

To the Editor:

Sir.—In your issue of March 14, received to-day, there appears a second letter from Mr. Hirsching, referring to Mr. Janin's article on my process of treating cupriferous gold ores. This letter requires reply.

Mr. Hirsching, in his quotation from page 36, in his book states: "Add then a dilute solution of ammonia, wash and leach with cyanide of potassium." If an ore is treated with ammonia, *then washed,* and then leached with cyanide it cannot be said to have been treated with an ammoniacal cyanide solution.

It is not necessary to repeat quotations from Mr. Hirsching's book, already given by Mr. Janin, as they show conclusively that Mr. Hirsching used all efforts, even going to the expense of steaming the tailings, to recover any retained ammonia and remove it before proposing to treat with cyanide.

Regarding Mr. Hirsching's criticism of Mr. Janin's statements of the chemistry of the process, it is obvious that Mr. Janin's statement, "when a solution of cupric oxide is dissolved in ammonia," is simply either a printer's error or transposition of the words in writing, the correct expression being "when cupric oxide is dissolved in a solution of ammonia."

The formation of cupricyanide under the conditions as stated by Mr. Janin is well known, and is, in fact, the basis of the method of estimating copper by standard cyanide solution. Surely Mr. Hirsching is acquainted with that method?

Regarding the oxidizing effect of a solution of cupric oxide in ammonia, this can be shown very readily: All ferrous or other reducing compounds are oxidized very rapidly and the cuprous oxide, formed at once, takes up oxygen again, when the solution is aerated. In this way copper acts as a carrier of oxygen.

It is, of course, well known that gold dissolves in a solution of cyanide only in presence of oxygen, or of nascent cyanogen, and every cyanider keeps his solutions as thoroughly aerated as possible.

I have not found that a solution of cupric oxide in ammonia oxidized cyanide to cyanate rapidly. A cyanide solution is not stable for any length of time under ordinary conditions. With apologies for this trespass on your space.

Bertram Hunt.

San Francisco, Cal., March 19, 1903.

(This discussion is concluded.—Editor.)

METALLURGICAL METHODS AT KALGOORLIE.

To the Editor:

Sir.—I note, in your last issue, a criticism of a recent article of mine. Mr. James appears to have taken great umbrage at my tentatively deprecating remarks on the Diehl Process; but both in my letter and article I stated that my conclusions were based upon information received and from personal knowledge, ascertained immediately before leaving Kalgoorlie, in December, 1901.

I am very glad to hear of the great success of the Diehl Process at the Hannan's Star, Brown Hill-Oroya, Brown Hill Extended, Lake View and other mills.

My reference to the loss of dust in the spitzlutten was based upon accurate information which I received when I was going through the Hannan's Brown Hill mills, a little while after their completion. I was informed that the spitzlutten formed a froth, around the edges, which carried off floating particles of telluride dust, which, adhering to the edges, dried and floated away in the form of an impalpable dust. This may or may not be true, but I merely state what was told to me by one *who ought to know,* and who also *showed* me some of the dust which he said was gathered from the edge of the spitzlutten.

In remarking upon filling of presses by pumps, I was referring to the direct application of the pump to the press without the intermediate accumulator, which I presume would overcome the difficulty and permit a regulated and equalized pressure, although I do not understand how the wear and tear on the pumps can be overcome.

In a letter dated early in January last, from Kalgoorlie, I am informed that the perforated plates are still in use there, although it may be possible that since I left, some of the mills may have adopted the use of filter-cloths over pyramidal surfaced filter-frames. That observation might also apply to the use of raising gear on the agitators.

So far as double filter-pressing is concerned, I would refer Mr. James to my article of January 24, wherein I state that the double treatment has been universally abandoned.

I fail to understand Mr. James' statement in regard to the amount of air required per press, as a little consideration and a practical knowledge of filter-press plant working should inform him that the charging of more than one, or at most two, rarely takes place at the same time, and I would reiterate my former statement, by saying that the approximate volume of air per press is about 80 cu. ft. per minute during the process of charging from the monteju, so that in a plant of 10 or 13 presses, where but one or two presses are being charged at the same time, the actual capacity of horse power required for the whole number of presses is but small. It appears to me, sir, that in this case Mr. James has gone out of his way to criticise, rather than taking into full consideration the whole intent of what I said in my article.

The large additions to the plant at the Golden Horseshoe were in process of construction when I left and my reference to that company's mill were ascertained by correspondence with present residents on the field.

My reference to Mr. Marriner's claim that the Main Reef mill had reduced costs to 18 shillings ($4.35) was based upon an assertion which was made in 1901, and my informant was Mr. Moss, General Manager of the Kalgurli Mine.

E. Barton Hack.

Denver, March 26, 1903.

(This controversy is now closed.—Editor.)

THE SAMPLING AND ESTIMATION OF ORE IN A MINE.—VI.

By T. A. RICKARD.

(*Continued from page 439.*)

ESTIMATION OF ORE RESERVES.

It has been well said that "if you want to arrive at intelligible issues—not to say conclusions—in any discussion, begin by settling the meaning of the terms you are going to use."[1] This is particularly necessary in discussing a subject which suffers from the want of definition. "Ore in sight" has become one of those nebulous phrases which are only noise and smoke. It is imperative that we have a clear conception of the fact signified by the technical terms we employ; when we find that they are robbed of sense as soon as we dissect them, it devolves upon us to discard them and seek for better ones. "Ore in sight," as used to describe the ore-reserves of a mine, is, if taken literally, a contraction in terms and, if taken otherwise, it has an elasticity which has caused many to stretch it until it has become so indefinite as to include the ore which is beyond even the most imaginative vision.

In order to express the results of careful sampling and estimation by a phrase which will at once convey its meaning, even to the untechnical, I would suggest "ore in reserve and ready to be broken," or "ore ready for stoping."[2] This would cover those parts of a mine which have been so cut up by systematic workings as to permit of very close calculations. Next would come the blocks of ground incompletely developed, but known to carry ore, which, in character and persistence, is similar to the main portion of the mine. These could be covered by the term "Probable ore reserves." Beyond this point a careful engineer will not go, avoiding "possible ore reserves," or any similar phrase, as a snare of the devil, because of the great likelihood that his client, or the shareholders who may follow, will disregard the qualifying adjective and commit him to a meaning which he did not intend to convey. When it comes to the chances of development, itself a most important part of the engineer's exercise of judgment, it will be best to include the consideration of this aspect of the inquiry under the paragraphs which deal with "the future prospects of the mine."

That is reserved which is stored for future use, therefore that which is to be used forthwith is not in reserve, from which it follows that by "ore-reserves" is meant such bodies of ore as are kept back for the present with a view to future use, when those are exhausted which are now being stoped. A mine which is being stoped at a rate so rapid in ratio to its development that it has, at any given time, only enough ore to keep the mill going for a few palpitating moments cannot be said to have any "ore-reserves." The idea of the latter includes a reservoir of supply not to be exhausted at short notice. As a consequence of these considerations it is obvious that the amount of ore which warrants being entitled "reserves" will depend upon the relative size of the reduction plant which is attached to the mine.

At the outset it is permissible to quote the famous dictum of President Cleveland, in referring to the tariff, "It is a *condition* which confronts us, not a theory."[3] Any attempt to establish uniformity of procedure in the estimation of ore-reserves is bound to break down because it disregards the inevitable diversity of the conditions which obtain in mining. Mines differ, as men do. A safe presumption in one case is a hazardous guess in another. During a recent discussion of this subject it was suggested that it was desirable for mining engineers to agree upon certain general rules, as to the allowance to be made in estimating ore. You might as well sign an agreement upon the percentage of trust to be placed in human nature. There are mines, the ore-bodies of which are of such a character that it is safe to predict their persistence for several hundred feet, there are others where the lode is so erratic that ten feet is a dangerous assumption.

Examples will serve to emphasize the range of variation. On the Rand a bedded vein of gold-bearing conglomerate extends for a great distance and over portions of its known length it maintains an average tenor so fairly constant that "the values of unworked portions may be closely calculated from the results achieved in adjoining developed mines."[4] In any given mine—to narrow the assumption—it is quite safe to calculate the average value of the ore in a block of ground, say, 300 ft. long and 150 ft. high, that is, after this block, 150 by 300 ft. has been sampled at intervals of, say, 10 ft., on every one of the four sides of the rectangle. This would be the ideal "ore in reserve," a thoroughly sampled block, not too big to vitiate the assumption of a certain uniformity in value per ton. In contrast to this I would quote such mines as, for example, the Seven-Thirty at Silver Plume, Colorado, or the Yellow Pine, near Boulder, in the same State, both of them mines which have been at some time richly productive, but with a distribution of value, in silver chiefly, so varying, so spotty and uncertain, that careful sampling, at regular intervals of even less than 10 ft., around the four sides of a block only 50 ft. square would afford the basis for an estimate which at its best would be only a reasonable guess. Each mine must be judged on its merits, in each instance the conditions vary, and while there may be a general similarity of method in getting at the various facts, there never can be any cast iron uniformity in the nature of the inferences deducible from the facts. Experience, silvered with age, is the presiding judge, and will decide whether this or that piece of evidence is relevant or not. Nor is there any room for pessimism or for optimism, one is as much out of place as the other, indeed, it is not too much to say that while a sanguine temperament will lead sometimes to exaggerated expectations, it is equally true that an overcautious hesitancy is to be condemned. Occasionally, an engineer in his effort to avoid risking his own reputation is apt to lean toward a timid conservatism which sacrifices the interest of his client. He is engaged to determine the facts, in the first place, and then to apply his best judgment to them. If the facts are insufficient, let him say so; if they are sufficient to warrant a decided opinion, let him enunciate it clearly to the end that his client may get the maximum benefit of his investigations.

"The proof of the pudding is in the eating." The exact profit to be won from a certain block of ore-bearing ground is best known when it has been mined and milled; even the most uniform ore has its spots of greater and lesser richness, the best estimate is therefore only a close approximation based upon the doctrine of averages. Nevertheless, if such estimates are occasionally wide of the mark it is not merely because of *la malice des choses,* that essential contrariness of things which will baulk even the best of engineers, but more frequently it arises from the disregard of the A, B, C of proper procedure and a judgment vitiated by financial participation in the undertaking itself. I am not of those who believe that the sampling of a mine is the one decisive factor in the diagnosis of it, on the contrary, I hold that as evidence it is crucial or merely collateral, according to the circumstances of the case, which may depend upon the past record of the mine, its future possibilities, the geological environment, economic conditions and other factors of primary importance.

(*To be continued.*)

[1] Dr. Thompson, late master of Trinity College, Cambridge.

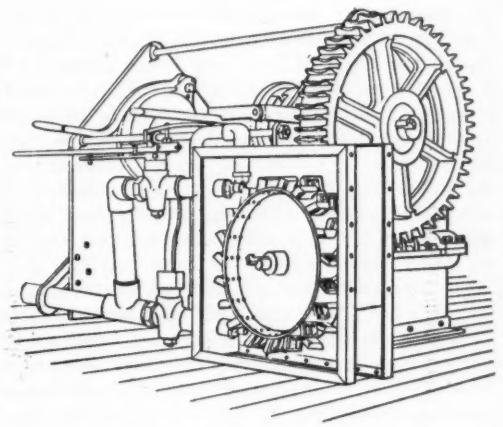
[2] This discussion of terms was written some time ago, before Mr. Argall brought forward the sensible suggestions which appeared in the ENGINEERING AND MINING JOURNAL of February 14, 1903.

[3] *Messages of the Presidents,* Richardson. Vol. viii, p. 590.

[4] G. A. Denny. "The Deep-Level Mines of the Rand," page 119.

AN APPLICATION OF THE PELTON WHEEL TO HOISTING.

The accompanying illustration, which is taken from the *New Zealand Mines Record,* shows a winch designed for dealing with large stones or boulders in hydraulic mines. It can also be used for timber where the mine is on timbered ground. It was designed by Mr. Mace, engineer to the Collingwood Gold-fields, and was built for the company by C. Peart, of Nelson, New Zealand. The construction is fully shown in the drawing. It is a compact, self-contained machine, the total weight being a little over 1,200 lbs. The Pelton wheel is double, having buckets riveted on pulleys in reversed position. The gearing can be reversed with ease by a lever which shuts off and turns on the supply. The speed is, of course, dependent somewhat upon the pressure of the water. The motion of the wheel is transmitted to the hoist by worm-gearing, as shown, and it is stated that the movement is very steady and noiseless. The machine shown is designed to lift any weight up to two tons.



PELTON HOIST FOR PLACER MINES.

Mr. Mace states that running under a head of 250 ft. the winch lifts a boulder weighing two tons at the rate of 1 ft. per second, and in operating, the cost of moving large boulders is about 4c. per ton. Two of the machines have been in use at the Collingwood Gold-fields property in the Quartz-Ranges District for over a year, and have proved extremely convenient. The cost of making this winch in New Zealand was about $300.

COAL IN EASTERN SIBERIA.—The Russian Government has appropriated 200,000 roubles to open the coal mines at Soochau in the Pacific province. The mines are also to be connected with Vladivostok by a branch of the Ussuri Railroad, while another line will be built to deep water on Nahodka Bay. The coal is a semi-anthracite, is an excellent steam coal, and burns with very little smoke.

IRON OXIDE IN SPAIN.—A rich vein of oxide of iron, discovered lately, near the city of Jaen, in the province of that name, about 85 miles from Malaga, is being worked by the Compania Mineralurgica. A plant for preparing the mineral for marketing among manufacturers of red pigments, has been established on the outskirts of Malaga. This is claimed to be the only deposit in Spain outside of a small one near Santander. The crude mineral is crushed, cleaned by washing and finally dried in kilns. The value of the crude mineral last year was 50 pesetas ($6.80) per short ton, at Malaga, while the prepared product was invoiced at double this price. Exports are being made to the United States, though England is the largest market for it.

HOISTING FROM GREAT DEPTHS.

By Robert Peele.*

The discussion aroused by Mr. H. C. Behr's elaborate paper[1] on "Winding Plants for Great Depths" is significant. Until recent years, the attention of mine superintendents and managers has been devoted chiefly to the various underground operations involved in the actual mining of the ore, the subject of hoisting and shaft work being considered of secondary importance. Now, with the increasing depth of large mines, the hoisting appliances for both ore and men demand closer study and more highly developed engineering skill.

Those who have, thus far, taken part in the discussion of Mr. Behr's paper have dealt especially with the exceptional conditions prevailing in South Africa. Aside from the existence of faults and local disturbances, the regularity and persistence of the Rand reefs, as already developed, warrant the engineer in expecting that ore will be found—within certain limits as to quantity and value—at depths even greater than any yet reached by diamond drilling and the sinking of very deep shafts is readily and confidently undertaken. In most precious metal districts, however, on account of the uncertainty as to continuity, quantity and value of the ore, the development of a mine is more or less tentative. In the United States, the Lake Superior copper deposits are the only metalliferous veins presenting conditions which, as regards general physical characteristics and persistence in depth, may be considered as at all closely approximating those existing on the Rand. Nevertheless the subject of hoisting from great depths possesses many points of interest to American engineers everywhere and will become of increasing importance in the future.

Stage-winding.—Though the idea of hoisting in stages is not a new one, Mr. Behr has performed a valuable service in demonstrating its applicability to very deep shafts. Given a convenient form of power for operating the underground hoisting engines of the lower stages, the question of cost alone would limit the depth that may be reached. However, the capacity of a plant consisting of no more than two stages will be likely to meet all requirements for some years to come, since Mr. Behr's conclusions show that it will serve for vertical depths of at least 7,000 ft.

The hoisting engines of the lower stages could rarely, if ever, be operated by steam, whether generated by an underground boiler plant, or by conveying steam from the surface. It is probable that electricity will furnish the cheapest and most convenient form of power for these engines. Builders of electric hoists will find no difficulty in supplying engines of any size that may be required. As examples of what has been done in this direction in recent years, the following Westphalian plants may be cited, as described by Prof. Habets.[2]

Preussen Shaft No. 2, at Harpen. Depth, 2,300 ft.; maximum hoisting speed, 3,150 ft. per minute; net load of coal, 4,840 lb. Koepe system of hoisting, the driving sheave being 19.7 ft. diameter, driven by a triphase asynchronous motor of 1,400-h.p. Capacity, 800 tons coal per 8 hours.

Zollern Shaft No. 2, at Gelsenkirchen. Depth, 1,640 ft.; maximum hoisting speed, 3,936 ft. per minute; net load of coal, 9,240 lb. Two flat rope reels on one shaft, on each end of which is a 1,400-h.p. motor. Capacity, 1,300 tons of coal per 8 hours. This 2,800-h.p. plant is probably the largest electric hoist yet erected.

An important feature of stage-hoisting, which, perhaps, has not been stated in sufficiently clear terms, is that it greatly increases the capacity of the shaft; since the cages or skips of the stages can be run simultaneously either in the same or in opposite directions. This is equivalent practically to doubling the hoisting speed of a single engine installed to do the same work. Conversely, a lower hoisting speed may be adopted, thereby easing the work of all parts of the plant and reducing the shocks liable to occur at high speeds. If the engines for both stages be placed on the surface and supplied by the same boilers, the skips or cages would of course be run in opposite directions, in order to equalize the steam consumption and reduce the size of the boiler plant.

Mr. Behr reaches the conclusion that for depths not over 4,000 or 4,500 ft., hoisting in a single lift is preferable to stage-winding. The writer, however, is of opinion that the limit may be considerably extended, say to 6,000 ft. Two points are to be considered in this connection, as follows:

1. The safe working limit of length of hoisting ropes.

2. The variation in load moment, due to the varying weight of the rope.

First.—It is taken for granted that the rope would be of the high-grade tempered steel, commonly known as plow steel. The ultimate tensile strength of this wire varies, according to its temper, from say 200,000 to a maximum of 300,000 lb. per sq. in. The question of elastic limit of very hard, highly tempered steel, however, makes it inadvisable to use wire with a greater tensile strength than say 250,000 lb. per sq. in. Beyond this, the metal becomes extremely hard and brittle, demanding the use of very large drums and sheaves and careful avoidance of abnormal shocks and strains caused by too rapid an acceleration in starting the load. This limit of tensile strength has been assumed by Mr. Hennen Jennings in his recent paper,[3] where he shows that with a factor of safety of 6, a rope 1.52 in. diameter may be used for hoisting a net load of 8,000 lb. in a skip weighing 5,000 lb., from a depth of 6,000 ft.

In the writer's opinion this would represent satisfactory practice for such a depth, both as regards the weight of ore raised per trip and the factor of safety adopted, provided the working strength of the rope be not too much reduced by bending on the drum and sheave. This is a matter which has not yet been considered in the course of this discussion. The strength of a rope is always less in the part which is bent in passing around the drum and sheave than in the straight part hanging in the shaft. This is due to the initial stress produced by the bending of the wires, and has been demonstrated by Mr. Wm. Hewitt,[4] of the Trenton Iron Works. He has shown in tabulated form these stresses for ropes and sheaves of different diameters the conclusion being, that only a part of the actual working strength of a hoisting rope is available for useful work. This reduction in strength depends upon the ratio between the diameter of the rope and the minimum radius of curvature of the drum and sheave on which it works.

Mr. Hewitt's investigations as to cast steel rope have shown that, to reduce the bending stresses sufficiently to leave one-fifth of the ultimate strength of the rope available for useful work, the minimum diameter of the bends must be about 80 times the diameter of the rope. On this basis it is safe to say that for plow steel rope, the sheave diameter should be at least 120 times that of the rope, and preferably even greater. In the case of the 1.52 inch rope instanced by Mr. Jennings, the ratio of 1:120 would give a sheave diameter of 15 ft., and if 1:150, the diameter would be 19 ft. A sheave 19 ft. in diameter might be objected to as excessive, but it may be pointed out that 20 ft. and even 24 ft. sheaves have been occasionally used in England. If the bending stresses of plow steel rope be cut down by adopting a ratio of sheave to rope diameter of say 150 to 1, the factor of safety of the rope may reasonably be reduced from 6 to 5, provided the ropes be carefully inspected each day and renewed promptly on showing signs of weakness. For a given load, therefore, the size of the rope may be reduced, thus decreasing the total dead weight to be hoisted, as well as the variation in load on the engine due to the varying weight of the rope.

The suggestion of a lower factor of safety is made deliberately, on the ground that the hurtful stresses in the rope due to the abnormal strains which are inseparable from rapid hoisting, may be, and usually are, less for long ropes in deep shafts than for similar work in relatively shallow shafts. A long rope has a greater total elasticity than a short one, and acts like a spring between the cage and drum. Undoubtedly, the severest of the hoisting stresses are those produced by starting a load with slack rope. If the engine be not stopped on the instant that the cage comes to rest on the chairs or keeps at a landing, a little slack rope will be paid out. Dynamometer tests have shown that on picking up the load with only from 4 to 6 inches of slack rope, a strain is produced equal approximately to twice the static load. This may be difficult to avoid, even when the engine is run by a careful man. Chairs are not indispensable, however, except in quite deep shafts, where the stretch of the rope is considerable from day to day, so that prompt and accurate landings could not be made without them. The starting stresses may be materially reduced also by placing a strong spring at the point of attachment between rope and cage. But, with an elastic, 19-wire stranded rope, it is precisely in deep shafts that these shocks are of least importance. For shafts of moderate depth, it has been customary in many mining districts to use a factor of safety of 8 or 10, and sometimes even higher, probably with a more or less indefinite idea that the static or dead load should not be the sole basis for calculating the required strength of a hoisting rope. Finally, however, if a low factor of safety be adopted, it should be with a full realization that the rope must be installed and cared for in a more perfect manner than usually obtains at mines.

Second.—In deep shafts with cylindrical drums, the variation in load moment, due to the varying weight of rope, becomes enormous. A 1.52-in. rope, 6,000 ft. long, weighs about 22,500 lb. With a skip and contents weighing 13,000 lb., therefore, the load on the engine, in making a trip from the bottom of the shaft to the top, varies from 35,500 lb. to only 13,000 lb. Mr. Behr has fully met this point in his demonstrations, covering a number of different cases, and has shown the disadvantage of working hoisting engines with unequalized loads.

Of the modes of equalizing the hoisting load for shafts of the depth under consideration, the writer agrees with Messrs. Jennings and Behr that the flat rope and reel may be omitted from the discussion. The safe working strength of a flat rope is about ⅓ less than that of a round rope of equal weight per foot, its life is shorter and the cost of repairs and maintenance greater, due to the necessary periodic renewing of the sewing wires.

Tapering ropes obviously greatly increase the working limit of depth for a rope of given diameter at the drum end. Their first cost, however, is higher than for ropes of uniform section, and though by their use the starting moment is reduced, still they afford but a distant approximation to the equalization of load so desirable for the economical working of large engines. As already pointed out by Mr. Behr, they are and have been so rarely employed that but few data as to their practical operation are available.

The relative merits of conical drums and of the Whiting modification of the Koepe system of

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[1] See the Engineering and Mining Journal, November 29, December 6, December 13, 1902, and February 14, 1903.

[2] *Revue Universelle des Mines et de la Metallurgie*, January, 1903.

[3] Engineering and Mining Journal, November 29, 1902, page 713.

[4] As stated in a paper by Mr. E. B. Durham, to appear in *Transactions* American Institute Mining Engineers, vol. 32.

hoisting with tail rope have already been dwelt upon at length. Several points, however, deserve further consideration:

1. *Practical difficulties of employing conical drums for very deep shafts.*—From the principle of the conical drum it is obvious that while the difference between the end diameters of the drum increases with the depth of shaft (or the length and weight of the rope), the axial length of the drum does not increase proportionately to the diameter of the larger end. In other words, if the end moments be made equal, the angle which the element of the cone makes with its axis becomes excessive for a very deep shaft, which may lead to difficulty in properly fleeting the rope upon the drum and even a liability that the rope may slip from a groove, thus causing a dangerous shock or even breakage. For depths of less than 3,000 or 3,500 feet, this difficulty is not serious, but for depths approximating 5,000 ft., the angle of the drum becomes extremely steep, provided it is really designed to attain equalization. A case in point is the huge double conical drum of No. 3 shaft of the Tamarack Mine, which is 10 ft. diameter at the small end and 36 ft. at the large end, the angle of the cone being about 52°. This drum is designed to hold 5,500 ft. of rope on each side, the portion from 17 ft. to 36 ft. diameter being used for hoisting from 4,500 ft. Trouble has been experienced with the fleeting of the rope on this drum, and the maximum speed of hoisting is kept lower than at shaft No. 2, which is provided with a cylindrical drum 30 ft. 6 ins. in diameter.

For very deep shafts, a compromise may be made by not attempting to produce complete equalization of the end moments, but merely to reduce the starting moment by adopting a flatter cone, i. e., relatively larger at the small end; or by employing a combination conical and cylindrical drum (cylindro-conical), as at the Tamarack shafts Nos. 1 and 5. For a double compartment shaft, the larger part of the drum is cylindrical, terminating at each end in a short frustrum of a cone. Each rope in turn winds up the conical surface and then over on the middle cylindrical part, the latter being occupied alternately by the over and under ropes. In this connection Mr. Behr brings out an important consideration. Since by using a taper rope the difference between the end moments is diminished, it follows that when taper rope is employed with conical drum the large diameter of the drum is reduced, and an objectionably steep angle of cone may be avoided.

2. *Use of tail rope.*—Mr. Behr has discussed the use of the tail rope, with cylindrical drums as well as in connection with the Koepe or Whiting systems. Messrs. Jennings and Robeson, however, have considered the tail rope only in its relation to the latter system of hoisting. The writer thinks that the virtues of the tail rope for vertical hoisting have hardly been sufficiently recognized. In practice its only disadvantages are, the extra weight imposed on the socket or other connection between the cage and the main hoisting rope, and the danger that the safety catches will fail to hold the cage in case the main rope should break. As to the first disadvantage, the cage connection can be made amply strong by using a thimble and a series of clamps, the end of the rope being bent back upon itself. This is much more reliable than the straight, conical babbitted socket. When the diameter of the rope is too great to permit of this plan, an extra long babbitted socket can be used, together with a pair of heavy, diagonal bridle chains from the cage to a clamp attached to the rope several feet above. The second disadvantage, it must be admitted, has no remedy save constant vigilance in inspecting the main rope and promptly discarding it when the wires begin to break.

From a mechanical point of view, the tail rope has much to recommend it and its applicability for deep hoisting should be emphasized:

A. Its cost is nominal, because it may be made of discarded main ropes, so long as the latter are strong enough to carry their own weight.

B. It produces almost perfect equalization of load on the hoisting engine, reducing the starting moment to a minimum and completely eliminating the serious disadvantage of a negative moment at the end of the hoist.

C. By its use an engine of given size can raise the load from a shaft of any depth. Omitting friction and the effect of the moment of inertia of a large and heavy cylindrical drum, no more power is required for 6,000 ft. than for 1,000 ft. As the mass set in motion increases, of course the periods of acceleration and retardation in starting and stopping the load must be lengthened; but this is true also of a Whiting hoist, though to a somewhat less degree.

It would seem that Mr. Behr is not warranted in confining his discussion of cylindrical drums with tail rope to depths of 3,000 ft. or less. No reason is apparent why the tail rope could not be satisfactorily employed for 4,000 or even 6,000 ft.

The question of flexibility of engines is referred to by Mr. Jennings, who says: "For great depths, it is seen that all the main winding engines of the world on these systems (double cylindrical and double conical drums) are made practically inflexible, the moving masses evidently being considered too great to be dealt with by clutches." This statement is hardly borne out by the facts. The Superior and Mackinac engines of the Calumet & Hecla Mine are arranged to drive four 22-ft. cylindrical drums operated independently by hydraulic friction clutches, the shafts being between 5,000 and 6,000 ft. deep, on a dip of 39°. The loads, not including rope, are from 7 to 9 tons. While it is true that the actual loads on the engine are much smaller than for vertical shafts of this depth, still, as the hoisting is not done in balance, or with any equalizing device, it is evident that the starting moments are very great. These drums have been running satisfactorily for years, so far as the clutches are concerned. It may be added that there is little to be said in favor of hoisting without balance from such depths.

The flat rope engines installed during the past few years at several of the deep Anaconda shafts for hoisting from a prospective depth of 5,000 ft. are also operated by clutches, the gross load at present depths being 13 tons, and the speed, 3,000 ft. per min. In view of these examples, it is clear that the Whiting system is not the only one adapted to deep hoisting.

As to speed of hoisting, except where men are raised and lowered, much higher maximum speeds are reached in several of the Lake Superior vertical shafts than those assumed by Mr. Behr in the various cases which he discussed. The Tamarack No. 2 engine, with a single cylindrical drum, 30 ft. 6 ins. diameter, often attains a rope speed of 5,000 to 5,500 ft. per minute in a shaft less than 4,000 ft. deep. This might be considered excessive, but the highest speed taken by Mr. Behr is only 4,176 ft. per minute, for a 6,000-ft. shaft. For such depths the writer sees no reason why a maximum speed of 5,000 ft. should not be adopted. In this connection, the character of the cage or skip guides is a pertinent one. Wooden guides are used in the Tamarack shaft above mentioned, as well as in general practice elsewhere in the United States. Steel rail guides are common in Europe, and while their first cost is greater, they are undoubtedly more substantial and safer for high hoisting speeds than those of wood.

Shaft-sinking.—It is suggested by Mr. Jennings that, on reaching a depth between 2,000 and 3,000 ft., the cylindrical drums of the sinking engine be replaced, for completing the shaft, by the Whiting sheave system with tail rope. As the tail rope system cannot be conveniently applied in connection with the actual work of sinking, Mr. Jennings further proposes that a temporary station be established at a depth of say 2,500 ft.; that one Whiting engine be used to hoist from this station to the surface and that the rock be hoisted in the lower section of shaft by a second Whiting engine, also placed on the surface. On completion of the shaft, both engines would then be used for regular hoisting without a stage.

Such a procedure does not appear to be either necessary or desirable, for the following reasons:

1. The tail rope of the upper stage would be used presumably on the score of economy, but in sinking deep shafts, speed is the chief consideration, economy in steam consumption being relatively unimportant. The actual cost of hoisting is but a small part of the total cost of sinking. Furthermore, any economy attained in the saving of power would probably be far more than offset by the cost of the excavation and appliances of the intermediate station, which would afterward be abandoned.

2. It does not seem reasonable to install the main engines merely for sinking, since they would be necessarily very much larger and more powerful than is required for hoisting the sinking buckets, nor could they be expected to operate economically when doing only a small part of the work for which they were designed.

3. The Tamarack shafts have been sunk to depths of about 4,500 ft. with ordinary single cylindrical drum engines of moderate size and cost, and undoubtedly could have been used for still greater depths. The capacity of such an engine may be increased if necessary by supplying two independent drums operated by clutches, or two separate sinking engines could be erected. Mr. Webb proposes to use two engines for sinking a seven-compartment shaft. Their entire cost needs not to be charged to expenses, as they could be removed for use elsewhere on finishing their work.

Raising and lowering men.—In working at great depths this is one of the most serious problems confronting engineers and managers. The conditions in the large mines of South Africa are somewhat peculiar in this regard; the native miners are not highly efficient, and as the reefs are rather thin, the quantity of ore mined per man per day is small. In fact, as stated by Mr. Jennings, referring to the statistics of the Rand Mines, Limited, for a 200-stamp mill, 7 Kafirs and 0.7 white men are employed underground per stamp, per day, 5 tons per day being taken as the stamp duty. On this basis 1.54 men must be raised and lowered for every ton of ore milled (0.93 man per ton mined), or 3,080 men for the 2,000 tons crushed by a 400-stamp mill. Mr. Robeson estimates that 2,310 men must be sent underkround for each 2,000 tons of ore hoisted. In the conglomerate veins of Lake Superior about 2 tons are mined per day for each underground employee, and in the amygdaloid probably 2½ tons. The ratio of number of men to total tons of ore and waste hoisted will depend largely on the thickness of the reefs, but in any case it is obvious that the mere handling of men alone in a 5,000 or 6,000-ft. shaft will require a large hoisting capacity.

Assuming two seven-compartment shafts, Messrs. Jennings and Robeson are in accord in proposing that the entire force shall be lowered and raised in two compartments of each shaft, the remaining four hoisting compartments being used for hoisting ore only. Their estimates show that practically all the daily running time of the man compartments would be occupied in handling the men. Mr. H. H. Webb, in his analysis of the proposition,[8] reaches the conclusion that such procedure would be inadvisable, and the writer is inclined to agree with him. The matter may be presented as follows:

1. If all six compartments of each shaft were utilized for handling men up and down between shifts, the total time occupied would be quite within reason. By using four-deck cages with 48 men per trip, Mr. Webb shows that by hoist-

[8] ENGINEERING AND MINING JOURNAL, February 14, 1903.

ing in two stages in a 6,000-ft. shaft (which would practically be the same as hoisting 3,000 ft. in a single stage), four compartments would have a capacity of 2,000 men per hour, or 3,000 men for six compartments. This estimate is on the assumption of a maximum speed of 2,000 ft. per min., or say 1,500 ft. average. Possibly this may be considered too high for man cages. If so, by adopting a maximum of 1,500 ft. and using six compartments, 3,000 men could be handled in say 1½ hours. After resuming the hoisting of ore, the man cages would be used for lowering material, etc.

2. A load of 48 men would weigh say 6,500 lbs., and the 4-deck cage, 5,500 lbs., making a gross load of 6 tons. As compared with the regular hoisting load of 6½ tons instanced by Mr. Jennings (ore, 8,000 lb., and skip, 5,000 lb), there would be some margin of safety as against the possibility of a breakage of the rope in the ore compartments, while men are on these cages. Moreover, the safety of the men in traveling in the ore compartments would be further assured by the reduction in rope stress due to the lower hoisting speed. On the other hand, as pointed out by Mr. Webb, if men were raised and lowered in two compartments only, these compartments would be kept in nearly constant use, and there would be an appreciable element of danger in the possibility of breakage of the ore hoisting ropes in the adjoining compartments, where high speed traffic is being simultaneously carried on.

3. The mode of handling outlined above is substantially the same as in many of the deep shafts of the Lake Superior district. It is true that in the deep inclined shafts of the Calumet & Hecla Mine, separate engines and ropes are used for the man cars, but at the Quincy Mine, in a 5,400-ft. incline, of an average dip of about 55°, the regular hoisting rope is used. At change of shifts the skip is taken off, and a man car is lowered into place by a crane over the mouth of the shaft and coupled to the rope in a few minutes.

An alternative would be to adopt the Calumet & Hecla practice of installing separate engines for handling the men. While the first cost would be considerable, it could not be considered prohibitive for the two shafts of a property as large as that assumed in Mr. Jennings' discussion, and the safety of the men would be guarded to a degree impossible by any other method.

COAL PRODUCTION IN ALABAMA.

Mr. J. de B. Hooper, State Mine Inspector of Alabama, has issued a complete and very useful report of the coal production of that State in 1902. The report, which is arranged in tabular form, gives the names of all producing mines, with their location, officers, output, number of men employed and many other particulars.

The production of coal in Alabama for 14 years past is shown in the following table, in short tons:

1889	3,572,893	1896	5,745,617
1890	4,090,489	1897	5,893,771
1891	4,750,781	1898	6,466,741
1892	5,529,312	1899	7,484,778
1893	5,270,042	1900	8,273,362
1894	4,361,312	1901	8,970,617
1895	5,705,713	1902	10,329,479

The increase last year over 1901 was 1,358,862 tons, or 15.1 per cent. Of the coal mined in 1902, there were 1,058,697 tons classed as lump; 166,059 tons nut; 1,232,919 tons slack; and 7,841,804 tons run-of-mine. About one-third of the coal mined was converted into coke.

The total number of men employed last year was 17,909, of whom 12,360 were classed as miners, 3,555 as inside laborers and 1,976 as surface laborers. The number of fatal accidents was as follows:

	1901.	1902.	Changes.
No. of men killed	41	50	I. 9
No. killed per 1,000 employed	3.45	3.58	I. 0.13
Tons coal mined to each life lost	218,186	206,590	D. 11,596

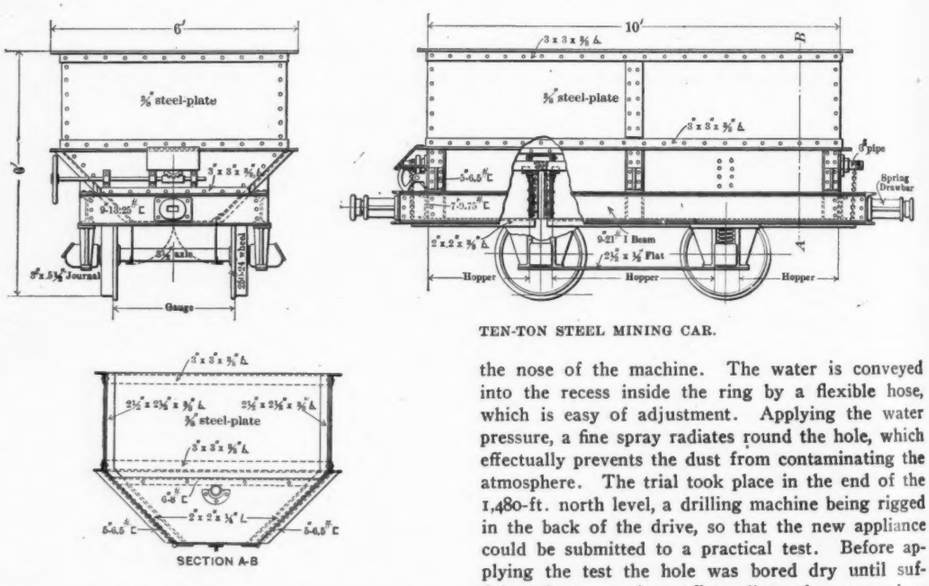
Nearly all the coal mined in Alabama is pick-mined. Machines were reported in use at only eight mines last year.

At the close of the year there were 7,168 coke-ovens in the State. The total production of coke for the year was 2,210,735 short tons; an increase of 218,174 tons over 1901.

A TEN-TON STEEL MINING CAR.

By W. B. DEVEREUX.

The car shown in the illustration was designed for special conditions. It was desired to provide an ore train, with which two men could load underground, transport and dump in the mill bins, a distance of a mile from the loading point, 600 tons of ore per shift. The tunnel was supposed to be 8 by 8 ft., but owing to rounded corners, it was found that the car as originally designed would not pass through it. The car as designed for 10 tons capacity was 6 ft. wide and 6 ft. high over all. As constructed, the dimensions are 5 ft. 8 ins. high, and 5 ft. 6 ins. wide over all, which gives a capacity of about eight tons. As the capacity of the mill at present is only 300 tons per day, only four cars out of six have been used. The track is 3-ft. gauge, rails 30 lb. to the yard, grade 12½ ft. per mile.



TEN-TON STEEL MINING CAR.

The novel feature of the car is a bottom dumping device, which was suggested by the writer and worked out in detail by Wonham & Magor, of New York, who constructed the cars. The bottom has three pairs of doors which drop between the axles. Over each axle is a narrow pocket running across the bottom of the car, which protects the chains suspending the doors. These chains are wound on a 3-in. iron pipe, which traverses the length of the car, and is supported by the ends of the car and the pockets. This pipe is turned by a worm-wheel and worm at the end of the car. Between the pockets the pipe is covered by an angle iron, which protects it from the falling ore. All slopes in the car are 45°.

The four-car train is hauled by a General Electric locomotive, having 2,500 lbs. draw-bar pull. Although the present loading pockets are temporary and not as convenient as they should be, two men on several occasions have loaded, transported one mile, and dumped 290 tons in a forenoon. The cars have been in operation several months and have given no trouble; experience in use suggests only a few slight changes. The wheels and axles are of standard railroad type. The power consumed is almost exactly the same for the loads going out and the empties coming in. It takes about 30 horse-power to start the loaded train on the level, and 7½ horse-power to run it after it is up to speed, and the same power going in empty. The motors are run in series, which gives a speed of about 7½ miles an hour.

There seems no reason to doubt that with the six-car train, and properly designed loading pockets, and with ore that does not clog the chutes, there will be no trouble in handling 600 tons per shift, with ample time remaining for transporting men and material.

DUST IN MINES.

As bearing upon the discussion of this subject in our last issue, we quote the following description of a method of preventing the formation of dust by rock drills, as described by our esteemed contemporary, the *Australian Mining Standard*, under date of January 29, 1903:

"An apparatus invented to overcome the evils arising from dust given off by rock drilling machines was submitted to a public trial at the Clarence United Mine, Bendigo, Victoria, last week. The patentee is Mr. James Gitsham, and the trial took place in the presence of a representative gathering of those concerned in the mining industry. The new contrivance is of simple construction, consisting of a perforated ring, which is attached to the nose of the machine. The water is conveyed into the recess inside the ring by a flexible hose, which is easy of adjustment. Applying the water pressure, a fine spray radiates round the hole, which effectually prevents the dust from contaminating the atmosphere. The trial took place in the end of the 1,480-ft. north level, a drilling machine being rigged in the back of the drive, so that the new appliance could be submitted to a practical test. Before applying the test the hole was bored dry until sufficient dust was given off to allow of a comparison being made by those present as to the efficacy of the new invention, which, on being brought into operation, effectively stopped the dust from rising. In the absence of a water jet in the 1,480-ft. level, a cylindrical vessel containing about 10 gals. of water was utilized, the necessary pressure being obtained by inserting an air jet into the vessel. The trial was adjudged by those present to have been most satisfactory."

IRON ORE IMPORTS OF GREAT BRITAIN.—Imports of iron ores into Great Britain for the two months ending February 28 were, in long tons:

From:	1902.	1903	Changes.
Spain	791,239	885,264	I. 94,025
Other countries	117,701	212,174	I. 94,473
Totals	908,940	1,097,438	I. 188,498

The other countries include Algeria, Greece, Norway and Sweden.

UTILIZING BLAST-FURNACE GAS IN BELGIUM.—The Société Jean Cockerill at Seraing, Belgium, is building two gas-engines for the Société Ougree-Marihaye, to be operated by the waste gas from the blast furnace. One of these engines is a 600-h.p. single-cylinder engine, which will operate the blowers. The other is 1200-h.p., of the tandem double-acting type, and is intended to operate dynamos. Both engines are of the type which the Cockerill Company has made familiar.

OBSERVATIONS ON THE RAND CONGLOMERATE.*

BY L. DE LAUNAY.

I. OCCURRENCE.

The observed facts, bearing upon the origin of the gold-bearing conglomerates of the Main Reef Series, may be summarized as follows:

1st. The ore containing the gold is a conglomerate or, rarely, a quartzitic sandstone, made up of pebbles and grains of sand, which are composed almost entirely of quartz, or, as an accessory, of quartzite. On the other hand, the cement consists of silica, containing pyrite and gold, together with the minerals due to metamorphism, such as chlorite, muscovite, etc. The pebbles are sometimes well rounded, sometimes their angles are only blunted, often they are flattened and, rarely, they are broken in place.

2d. The beds containing gold in varying degree, whether workable or not, extend over a thickness of several thousand meters of sandstone and conglomerate, with rare intercalations of schist, at their base, but devoid of any limestone formation.

These different layers of gold-bearing conglomerate exhibit locally frequent persistent variations in thickness and in the intervals separating them; sometimes they fork so as to enclose a mass of sandstone, only to unite again further on; nevertheless, as a rule, a layer of conglomerate or sandstone, which seems to appear suddenly, is only the enlargement of a layer previously marked by an obvious indication (a seam of sandstone or a string of scattered pebbles), and the geological section, on the whole, from one end of the auriferous zone to the other, presents a marked uniformity; the richness in gold seeming, on an average as far as one can judge from observations as yet very incomplete, always localized in the same series of beds.

3d. The mechanical features, subsequent to the formation of the conglomerates, are numerous and clear. In the first place, good note must be taken of the dip of the beds and their arrangement in an east-west syncline, which is the result of a later folding, the actual slope of the reefs being absolutely inconsistent with the conditions of their deposition. One observes likewise: the occurrence of true clay-selvages, corresponding to planes of slipping and crushing; the faults, for the most part reverse and parallel to the strike of the beds, and disposed like overlapping scales, an effect due probably to a compression coming from the south; there are also the dikes of eruptive rock.

4th. The gold, in the ores, is often in a free state, but always invisible to the naked eye and very fine; it is constantly associated with pyrite, but does not seem to be combined with it; the amount of gold present is not necessarily proportioned to the abundance of pyrite, and often one can see the gold, under the microscope, in crystals enclosed within the pyrite itself. This pyrite, which forms fully 5 per cent of the weight of the rock, is, in general, remarkably pure, and contains only exceptional traces of copper, lead and zinc.

5th. The gold and the pyrite occur, almost exclusively, in the cement of the quartz pebbles, which themselves, whatever their size, scarcely ever contain either pyrite or gold, except, very rarely, in fissures or within beds of a special character, such as those of the Rip series.

6th. The gold-bearing pyrite is present in the form of isolated grains irregularly distributed through the siliceous cement; it often forms a trail of grains, rarely continuous veinlets, around a fragment of quartz, as is observed frequently in quartz veins. The trails of pyritic grains may be either parallel to the general stratification or oblique to it, and conforming to a false bedding. This pyrite, examined by a lens or under the microscope, looks at times as if rolled or broken, this being notably the case in the parallel veinlets; more often it is well crystallized and presents sharp angles, difficult to reconcile with the idea of a prolonged trituration.

7th. There is a generally recognized relation between the size of the pebbles and the richness in gold, within a limited portion of the same beds. The fine sandstones are very rarely gold-bearing, and only along certain belts of disseminated pebbles which are easily overlooked. In the conglomerates themselves the layers of large pebbles are considered particularly rich, especially such as occur along the bottom of a bed.

In any given bed the ores considered as favorable in appearance are in general those carrying fairly large pebbles, sufficiently widely spaced, but not too much so, with a cement having a dark tint, due as much to the special nature of the quartz as to the abundance of pyrite. But as between one bed and another, even when they are very close to each other, like the Main Reef Leader and the Main Reef, neither the general appearance nor the size of the pebbles affords any idea of their richness. With an identical appearance the Main Reef, although much thicker, will be poor, while the Main Reef Leader will be rich.

8th. In any given bed of conglomerates, the richness in gold is not necessarily, as in gold placers, always concentrated at the base; either it is uniformly distributed throughout the mass, or if it is localized within a single layer, this layer may just as well be in the upper as in the lower portion of the bed, although the second alternative is the more frequent.

9th. Within the same layer the gold values, without, however, permitting the formulation of an undeviating generalization, appear to be highest when the thickness is least, as if there had been a certain quantity of gold for distribution over the entire thickness of the layer. The comparison of the thin, but rich, layers of the Main Reef Leader and the South Reef with the thick layer of the relatively poor Main Reef, intercalated between them, is suggestive of an analogous observation.

10th. A certain number of reefs, often very rich, occur at the contact of beds of schists, intercalated between the latter and the quartzites; examples of this mode of occurrence are found in the East Rand, Van Ryn, Modderfontein and Nigel properties.

II. HYPOTHESES OF FORMATION.

If we first consider the formation of the quartzites and conglomerates, quite apart from any gold which they contain, we may conclude that we are dealing with very extensive deposits—by no means confined to any small lacustrine basin—but deposits perhaps of marine origin[1], which originally occupied a nearly horizontal position, and owe their present dip to a subsequent compression which brought about a great NE-SW syncline.

The presence of the gold is in no way necessarily connected with the formation of the conglomerates, but, on the contrary, appears to constitute an occurrence of a relatively local character. All the hypotheses which have attempted to explain this feature of the problem resolve themselves into three questions: Was the gold formed before, during, or since the conglomerate?

The three corresponding theories, which I will try to set forth impartially and without committing myself to a conclusion, are admittedly open to so many objections that the origin of these deposits must still be considered obscure, despite all the efforts made to explain it. I am not ashamed to confess that the more I ponder over the problem and the more I consider the various complicated and contradictory data, the more I hesitate to commit myself to a decided opinion.

The first hypothesis, by reason of its simplicity, suggests itself readily, and I myself argued in its favor before I had visited the Transvaal. The same thing was done by Messrs. Schmeisser, Goldmann, Becker and others, even after they had made a thorough investigation. The hypothesis is that of a placer of the Primary period, resulting from the destruction of large gold-bearing veins and their mechanical deposition, followed by a recrystallization of the pyritic and siliceous cement through the agency of metamorphism.

According to this theory, there would have been, at the period indicated by the Hospital Hill series, in the Witwatersrand, a destruction of gold-bearing veins similar to those which a little later impregnated the schists at Barberton. Perhaps even these veins might have been disintegrated, and their fragments stratified almost in place at the time when they were in process of formation.

In support of this theory one can state that, besides a general vague resemblance to the placers of California, there is the existence (which has been mentioned already) amid the conglomerates of the Transvaal, of pyritic zones almost like stratified beds; there is also the frequent presence of a small amount of rolled pyrite of microscopic size, etc. The hypothesis in question explains well enough why the conglomerate made up of very large pebbles (the Rip Reef, etc.) contains, alongside of nests very rich in gold, portions which are absolutely barren—the mechanical process having been unfinished; while, wherever the very fine sediments were deposited the waters did not have velocity sufficient to hold the pyrite in suspension; thus also, an intermediate dimension of the triturated elements would, according to this idea, have been favorable to the simultaneous precipitation of the pyrite and the gravel.

It must be added that the persistence and the comparative regularity of the deposit—difficult as these features are to explain by any hypothesis—can, if we stretch a point, be compared to these characteristics as observed in the ancient auriferous gravels of California. The presence of several auriferous layers on top of each other, separated by deposits of finer material, is also a recognized feature of placers. Finally, numerous instances are known in California of a siliceous cement, with crystalline pyrite, which has re-cemented an alluvial gravel.

On the other hand the objections to this theory are as follows: In the very first place, if one considers a given bed, it is obvious that the mechanical preparation of the pebbles, pushed to such a degree of selection that all the rock not so hard as quartz has been eliminated, pre-supposes of necessity either a long torrential transport of at least 20 to 25 kilometers or a very prolonged trituration in place by wave action.[2] Though the associated pyrite is very fine and may, as a consequence, have remained suspended in the water, it is still difficult to explain how it was derived from the same rocks which furnished the quartz; how, in the case of a torrent, it was not deposited sooner and in the case of sea waves, how it became concentrated between the pebbles instead of undergoing this process in the fine sands, as generally happens with hard products, such as garnets, magnetite, tinstone, corundum, rutile, or even pyrite, all of which are found mechanically stratified along certain shores at the present day; and how is it that this pyrite is so often crystalline?

Moreover, even if we admit the progressive spreading of a large marine delta, subsequently subjected again to the action of the waves and coast currents; if the pebbles of quartz and the pyrite of the cement originated as supposed from the disintegration of the same veins, why then are the quartz pebbles so seldom gold-bearing? To this, it is true, one can attempt to reply by saying that the pyritic portions of the quartz, being the most friable, have been the most completely broken up, and that the fragments

* Translated by the Editor. From "Les Richesse Minerales de L'Afrique," Paris, 1903.

[1] The great extent of this occurrence, of which traces are believed to be recognized at the opposite extremities of South Africa, the relative regularity of the beds, the frequent presence of flattened pebbles are preferably characteristic of a marine deposit than a lacustrine. But the deposits of coastal shingle rarely have more than a small width transversely to the shore. One might perhaps think of vast fluviatile formations, of torrential deltas spread along an alluvial plain, like that of Lombardy. In any case, the conglomerates ought to reach, north and south of the Witwatersrand, far beyond their actual limits and should not have disappeared save as the consequence of later erosion.

[2] The sea sands are generally quartzose by reason of this mechanical preparation; their pebbles indicate in the same way a concentration of the hard rocks of the coast, such as flints. It is to be noted, moreover, that the presence of pebbles such as those of the Main Reef supposes necessarily that the water which displaced and concentrated them had a considerable velocity, of at least 60 cm. to 1 meter per second.

were readily split open along veinlets of auriferous pyrite, these being the lines of least resistance, while the barren cores resisted. But the more obvious inference from this is that the pebbles and the pyrite had a different origin; the pebbles coming from quartzose veins, which might have contained, perchance, some traces of pyrite or even of gold, as is frequently the case in the quartz-veins of the Transvaal; this would suffice to explain the presence (I repeat, very rare) of a little gold in these pebbles.

Finally, the greatest objection to this theory is that these veins, from which the gold-bearing pyrite is supposed to have originated, are not known to exist. They have not been discovered, in spite of a fairly thorough exploration of the adjacent country. Now, if similar pebbles of quartz could come a distance of 100 kilometers, it is quite improbable that the pyrite has traversed the 250 or 300 kilometers which separate Johannesburg from Barberton or from Lydenburg, not to mention the fact that if the Lydenburg schists are really contemporaneous with the conglomerates of the Rand, the bedded veins, which occur there, are necessarily posterior to the one as to the other, and consequently could not furnish detrital gold before it was formed. When pyritic agglomerates are stratified along our coasts, it is at the foot of the limestone cliffs from which they are derived. A score of kilometers seems to be the maximum distance to which one ought reasonably to seek for such reefs.[3] Must we then admit that subsequent to the period during which the conglomerates were formed, the veins, from which they were derived, have been destroyed down to their very roots? This idea is as much in accord with the opinion one is able to form of the enormous erosion which South Africa must have undergone, as it is in harmony with the thesis, repeatedly defended in this volume, regarding the disappearance of the vein type of ore deposit at a certain depth in the earth's crust (generally attained in Africa), and its transition into impregnations more directly due to the pressure of eruptive magmas. However, one cannot pretend that such a reply is at all satisfactory.

As regards the second supposition, that is, that the auriferous pyrite was introduced at the moment of the deposition of the sediments, such a view of the problem necessitates the idea that some gold and some iron pyrite (due perhaps to a vein forming process) were in solution in the water, along a shore where fragments of quartz, whatever their origin, were being triturated and rolled by the waves; in that case the gold and pyrite would have been chemically precipitated like the copper sulphides of Mansfeld in Germany or the lead nodules in the standstone of Commern and of Mechernich, in Rhenish Prussia, or, again, like the ores of copper associated with the conglomerates of Boleo. They would have been rolled in place by the waves, and might thus have become deposited more or less indiscriminately with the pebbles.[4]

In order to take into account the fact that the gold is almost exclusively in the conglomerates and not in the intermediate sandstones, one could admit the effects of a certain mechanical process, which, at the time of their formation, had concentrated the gold and the pyrite, by reason of their specific gravity, in company with the largest pebbles, as is known to have happened in gold-bearing gravels. One must take good note that the passage of a sandstone into a conglomerate, in a series of sedimentary deposits, corresponds either directly to a movement of the ground or to a modification in the system of currents (this also being possibly traceable to a movement of the same kind); such a movement, therefore, might have brought about, each time, an emission of springs, containing sulphur or chlorine, so as to renew the metalliferous substances in solution in the water.

It is thus at Boleo, where at three different times it has happened that a re-appearance of a conglomerate formation has determined an almost simultaneous precipitation of copper.

The same idea applies to the ore deposits of the Lake Superior region, which, apart from the metal, present a great analogy to those of the Witwatersrand; the copper has been concentrated in the cement of the conglomerate.

In this theory it is not difficult to explain the presence of the crystalline pyrite by the side of the rolled pyrite, either by a very likely recrystallization or through pyritic grains which were directly precipitated, so escaping the action of the waves. Nor is there anything to prevent the supposition that the waters charged with metallic salts may have penetrated into the beds previously deposited and cov-

IN A WITWATERSRAND MINE, SHOWING BANKET.

[3] A stream of water might very well carry gold for a considerable distance; but then it surely would not spread itself over 70 kilometers in length and several kilometers in width.

[4] The fact that pebbles of pyrite, essentially friable, have been able to resist, suggests the thought that they were rolled almost in place and that they did not undergo a lengthy transport, such as it would be necessary to suppose if they had arrived with the pebbles of quartz. On the other hand, the angular appearance of many of them is perhaps due to the fact that as soon as they were broken they were caught in a precipitate of gelatinous silica, charged with iron sulphide, which effectually served to imprison them.

ered over by the sea, circulating preferably through the larger interstices formed by the big pebbles. At all events, the surface of the pebbles must have exercised a precipitating influence, and the deposit must have formed itself upon them, as is frequently observed in the case of pebbles placed in a ferruginous or calcareous solution, where they become soon coated with rust or carbonate of lime.

Nor is it difficult to conceive of the precipitation of the gold which was in solution, and it is not necessary to demonstrate the presence of reducing organic matter (of which, however, there are examples at Buffelsdoorn, etc.). Gold is precipitated from solution by all kinds of influences, between which there is plenty of choice.[5]

Finally, according to this theory the primary origin of the gold might be attributed either to thermal springs containing gold and silica in solution, like those to which we attribute the formation of ordinary gold-quartz lodes, or even, if one sees fit, to the destruction of veins of this character, but a destruction which has been followed in this case by a chemical solution instead of being limited merely to a mechanical process.

A first objection to this hypothesis is that it is necessary to suppose that, during the enormous lapse of time required for the formation of the Hospital Hill series, there was a repetition of occurrences, a frequent return, into this sedimentary basin, of waters containing iron sulphides and chloride of gold, without the simultaneous eruption of any igneous rock (as in the Lake Superior region, as at Boleo), such as might furnish the beginning of an explanation to this phenomenon.

On the other hand, it is difficult to conceive of the chemical precipitation of metallic sulphides amid waters which were so violently agitated and stirred as to move these masses of pebbles. We are accustomed rather to see chemical precipitates deposited in quiet waters, concentrated by evaporation.

Finally, the localization of the gold in the beds composed of large pebbles is only incompletely explained.

The third theory presents some attractive features, but gives rise to difficulties even more serious. This theory admits that the advent of the pyrite must have been subsequent to the deposition of the stratified beds of sand and pebbles, and that we have to deal with a lode formation, of hydro-thermal and deep origin, of a special type. It supposes that the mineralizing waters, instead of circulating, as usual, along the rock-fractures, insinuated themselves into the interstices separating the pebbles, as through a filter, precipitating the salts they carried in solution upon the surfaces of the pebbles. Thus there must have occurred something, but on a larger scale, analogous to that admitted in the case of the cinnabar deposit of Almaden, where the mercury sulphide, accompanied by silica, hydrocarbons and a little iron sulphide appears to have impregnated some porous layers of sandstone along the entire extent of certain strata. There must have been in these beds of sand and pebbles, some kind of large subterranean sheets of water, containing, in solution, silica, iron sulphide and chloride of gold, which must have congealed bodily like a jelly.[6] In other words, the gold-bearing pyrite would be a product of metamorphism similar to that which formed the chlorite or musovite. Thus, the Rand ore deposits would become a simple but particular case of the type of deposit represented by the various formations of South Africa, which carry gold-bearing pyrite. All of these we consider as the result of a subterranean impregnation, produced, under pressure and in depth, by mineralizing waters, coming from an eruptive magma (granitic), and as having filtered, in the vicinity of such a magma, into the open interstices, notably into the crevices of the schistose beds, where they developed their characteristic structure of bedded veins. It is supposed that, either during the intrusion of the ancient granite, or during the period marked by the Black Reef,[7] or even much later, a far-reaching emanation of sulphide waters must have affected different geological formations, throughout South Africa.

In this way one need only invoke one era of sulphide waters instead of admitting a series of them; it explains the frequent localization of the gold in the small conglomerates situated between the quartzites and the schists (the contact of a schistose bed being always favorable to the circulation of solutions) and it explains equally well how the distribution of the gold is independent of the nature of the pebbles, to which one need only attribute the part of a mechanical filter, the constituents of which do not require to be gold-bearing in themselves. The localization of the gold in the pebble beds would be the result then of the fact that the interstices were more freely open to the penetration of the waters than the sands of the quartzite,[8] and if one admits a relation (to my mind incorrect) between the richness in gold and the dikes of eruptive rock which traverse the beds, or between the grade of the ore and the steepness of the dip of the beds, these phenomena would become equally easy to understand.[9]

Finally, this theory would afford a good explanation for the variations in the grade of the ore, as it is observed in following the line of the outcrop from one claim to anther, and likewise the relative uniformity of zones, rich or poor, in sinking on the dip, while the placer hypothesis would appear to require a uniformity along a line parallel to a primitive coast and a progressive decrease in richness as distance is gained transversely to the shore line.[10] This hypothesis, however, has the defect of failing to make clear why the pebble beds of the same degree of coarseness and of identical physical structure are, at a distance of a few meters, one gold-bearing, the other barren; why the gold-bearing pyrite is confined to a certain number of distinct layers, instead of being disseminated all over, according to the chances offered by the varying structure of the conglomerate. In the case of the ore deposits termed bedded-veins, which are really lodes, it is usual to find stringers, oblique to the stratification and passing from one layer to another. On the Rand we know of no example of such an occurrence, [11] Finally, and this is more serious, the third theory gives no clue to the presence of the rolled pyrite,[12] and is scarcely in accord with the general appearance of the pyrite grains, as they are seen under the microscope.

THE BESSEMER GOLD MEDAL.—The Council of the Iron and Steel Institute has unanimously resolved that the Bessemer gold medal for 1903 should be awarded to Sir J. Kitson, past president of the Institute, in recognition of his services to the iron and steel industry of Great Britain.

[5] One might consider, as coming within the scope of this idea, a fact concerning which Dr. Koch has insisted a great deal, and which resulted from his microscopic observations; namely, that the free gold of the conglomerates is not transported gold, but gold crystallised by a secondary process, after having been in solution.

[6] One might consider the hypothesis of M. Prister as an offshoot from this third theory. According to M. Prister, the gold, separated (by mechanical precipitation) in a marine placer, might have been re-dissolved and would then have penetrated by descent into the lower beds, where it became precipitatd.

[7] In the Rand, those who do not believe in the placer formation admit willingly that there is a relation between the gold and the dikes of eruptive rock, which, as a matter of fact, occasionally do contain pyrite or even goldbearing pyrite, as may occur in any similar basic rock. I have already discussed this influence, which does not appear to me to exist. There is every probability that the eruptive rocks encountered in the mines of the Rand may be posterior to the formation of the gold. A relation with other more ancient eruptive magmas, however, is still possible and it would support the third hypothesis now under consideration.

[8] The appearance of the pyritic stratification would then be attributed to an infiltration of sulphide among the remains of an older stratum.

[9] It has been noticed in the rich zones of the Rand, such as those of the Robinson and the Ferreira mines, that it is not a single reef only which becomes rich, but the whole series, at the same time. The theory of a posterior enrichment seems best adapted to explaining this fact, which is difficult to understand when one admits of successive occurrences, independent of one another. This would apply whether they were mechanical deposits or chemical sediments.

[10] One must not forget that the direction of the coast or that of an ancient stream of water may have no relation to the length or the axis of the existing syncline.

[11] One cannot consider as such lodes the few veins of white quartz with pyrite, which form restricted lenses, nearly always barren, in the midst of the beds of ore.

[12] One could, it is true, ask if the pebbles of rolled pyrite had not a distinct and independent origin from that of the crystalline pyrite, but it seems to me that this would only uselessly complicate the hypotheses and that the two kinds of pyrite, on the contrary, have in their deposition, an intimate connection.

THE ANTHRACITE COMMISSION ON STRIKE METHODS.

The comments of the Anthracite Strike Commission in its report—the substance of which we published last week—on the subject of violent methods of enforcing or defeating the claims of strikers, deserve careful consideration. For that reason we give that part of the report below, practically in full:

The testimony taken before the Commission proved that some discrimination, on the part of both operators and union men, was made, before and after the strike was inaugurated, and even, to some extent, after it had been declared off. It is difficult, of course, to determine just how far the employers declined to re-employ miners, simply because they were members of the union, or just how far the miners themselves refused to work with non-union men. In the letter (given in first part of the report) it is stated that the understanding is that "the miners will return to work and cease all interference with or persecution of any non-union men who are working or shall hereafter work."

The testimony does not reveal any considerable amount of interference on the part of members of the union with non-union men, after work had been resumed—that is, after October 23. Nevertheless, it is evident to the Commission that discrimination, whether on the part of the operators or of any of their employees, is a serious menace to the discipline of the mines. There is no industry in which discipline is more essential than in mining. The hazardous nature of the work calls for the best discipline; it is to the interest of the employer and the employee to see that it is maintained. Each should aid the other, not only in establishing the best methods for securing discipline, but in efforts to preserve it. Discrimination and interference weaken all discipline.

Although some reflections on the general subject have been made, no discussion of the conditions prevailing in the anthracite region during the continuance of the late strike, would be adequate, that did not fully deal with the disorder and lawlessness which existed to some extent over the whole region, and throughout the whole period. It is admitted that this disorder and lawlessness was incident to the strike. Its history is stained with a record of riot and bloodshed, culminating in three murders, unprovoked save by the fact that two of the victims were asserting their right to work, and another, as an officer of the law, was performing his duty, in attempting to preserve the peace. Men who chose to be employed, or who remained at work, were assailed and threatened, and they and their families terrorized and intimidated. In several instances the houses of such workmen were dynamited, or otherwise assaulted, and the lives of unoffending women and children put in jeopardy. The armed guards, employed to protect the collieries and the men who worked them, appear not to have been an unnecessary precaution, and the governor of the State was, as the evidence before the Commission shows, justified in calling out the citizen soldiery of the Commonwealth to preserve its peace and vindicate its laws.

The resentment expressed by many persons connected with the strike, at the presence of the armed guards and militia of the State, does not argue well for the peaceable character or purposes of such persons. No peaceable or law-abiding citizen has reason to fear or resent the presence of either.

It is true that exaggerated accounts of the disturbances were published, and there was testimony from reputable witnesses, tending to minimize them, and vouching for the good order of the communities in which such witnesses lived; but these were mainly in the localities where the operators made no attempt to work the collieries. It is also true, and justice requires the statement, that the leaders of the organization which began and conducted the strike, and notably its president, condemned all violence, and exhorted their followers to sobriety and

moderation. It would seem, however, that the subordinate local organizations and their leaders, were not so amenable to such counsels as to prevent the regrettable occurrences to which reference has been made.

In making this arraignment, we are not unmindful of what appears to be the fact, that the mine workers of the anthracite region are, in the main, well-disposed and good citizens of the Commonwealth of Pennsylvania, and that it is in the power of a minority of the less responsible men and boys, together with the idle and vicious, unless properly restrained, to destroy the peace and good order of any community. Absence of protest and of active resistance on the part of the better element, means encouragement and license to the class above described. It has been declared by some persons that this state of things is no more than was to be expected in communities where such large numbers of men and boys were idle for so long a time. If this be so, and it is not necessary for our present purpose to traverse the truth of this statement, it affects seriously the responsibility of those leaders of a labor movement who are, in the main, responsible for the inauguration and conduct of a strike.

There can be no doubt that without threats, intimidation and violence toward those who would otherwise be willing to remain at work, or take the places of those who had ceased to work, the coercion of employers, which a strike always contemplates, would be less potent in compelling acquiescence in its demands. This is the danger point of the whole matter. The law, which governs all citizens of a free country alike, can make no exceptions. The beneficence of labor unions is acknowledged. Their development, as we view it, has been one of real, though of slow and intermittent, progress to the betterment of labor conditions and to improvement in the relations between employer and employed. All combinations of men, however, to achieve a common purpose have potencies for evil. Such combinations are more than mere aggregations of the rights and powers of the individuals composing them. They become new and powerful entities, and factors for good or ill, according to the wisdom or unwisdom with which they are managed and controlled. The strike ordered by a trade union, which compasses no more than the enforcement of demands previously made, for the supposed benefit of its members, by the cessation from work in the event that those demands are not complied with, transgresses no law of a free society, and, whether wise or unwise in inception and purpose, is an exercise of no more than the legal rights that belong collectively or individually to its members.

It is true that the stress thus placed upon employers, may constitute a kind of coercion, resulting, in some cases, in an enforced compliance with the demands of the association or union. Such coercion, however, is not illegal, and does not come within the condemnation of the law. It is the indirect consequence of the legal exercise of the right to work, or to cease to work, belonging to all men.

But a strike set on foot with the view to the accomplishment of its purpose by intimidation or violence, exercised against those who choose to remain at work, violates the law from the beginning. Where, however, the strike itself is separable from the illegal violence and intimidation, which in many cases accompany it, the legal liability for such violence and intimidation rests alone upon the individuals who commit the act, and those who aid, encourage and abet them. Though no illegality of purpose is imputable to those inaugurating a strike, its existence, if it involve large numbers of men in a single community, tends, of itself, to produce disorder and lawlessness.

As has been said, the idle and vicious, who are in no way connected with the purpose or object of the strike, often unite with the less orderly of the strikers themselves, in creating the deplorable scenes of violence and terror, which have all too often characterized the otherwise laudable efforts of organized labor to improve its conditions. Surely this tendency to disorder and violation of law imposes upon the organization, which begins and conducts a movement of such importance, a grave responsibility. It has, by its voluntary act, created dangers, and should, therefore, be vigilant in averting them. It has, by the concerted action of many, aroused passions, which, uncontrolled, threaten the public peace; it, therefore, owes society the duty of exerting its power to check and confine these passions within the bounds of reason and of law. Such organizations should be the powerful coadjutors of government in maintaining the peace and upholding the law. Only so can they deserve and attain the respect due to good citizenship, and only so can they accomplish the beneficent ends, which for the most part they were created to attain.

A labor or other organization, whose purpose can only be accomplished by the violation of law and order of society, has no right to exist.

The right to remain at work where others have ceased to work, or to engage anew in work which others have abandoned, is part of the personal liberty of a citizen, that can never be surrendered, and every infringement thereof merits, and should receive, the stern denouncement of the law. All government implies restraint, and it is not less, but more, necessary in self-governed communities, than in others, to compel restraint of the passions of men which make for disorder and lawlessness. Our language is the language of a free people, and fails to furnish any form of speech by which the right of a citizen to work when he pleases, for whom he pleases, and on what terms he pleases, can be successfully denied. The common sense of our people, as well as the common law, forbids that this right should be assailed with impunity. It is vain to say that the man who remains at work while others cease to work, or takes the place of one who has abandoned his work, helps to defeat the aspirations of men who seek to obtain better recompense for their labor, and better conditions of life. Approval of the object of a strike, or persuasion that its purpose is high and noble, cannot sanction an attempt to destroy the right of others to a different opinion in this respect, or to interfere with their conduct in choosing to work upon what terms and at what time and for whom it may please them so to do.

The right thus to work cannot be made to depend upon the approval or disapproval of the personal character and conduct of those who claim to exercise this right. If this were otherwise, then those who remain at work might, if they were in the majority, have both the right and power to prevent others, who choose to cease to work, from so doing.

This all seems too plain for argument. Common sense and common law alike denounce the conduct of those who interfere with this fundamental right of the citizen. The assertion of the right seems trite and commonplace, but that land is blessed where the maxims of liberty are commonplaces.

It also becomes our duty to condemn another less violent, but not less reprehensible, form of attack upon those rights and liberties of the citizen, which the public opinion of civilized countries recognizes and protects. The right and liberty to pursue a lawful calling and to lead a peaceable life, free from molestation or attack, concerns the comfort and happiness of all men, and the denial of them means destruction of one of the greatest, if not the greatest, of the benefits which the social organization confers. What is popularly known as the boycott —a word of evil omen and unhappy origin—is a form of coercion by which a combination of many persons, seek to work their will upon a single person, or upon a few persons, by compelling others to abstain from social or beneficial business intercourse with such person or persons. Carried to the extent sometimes practiced in aid of a strike, and as was in some instances practiced in connection with the late anthracite strike, it is a cruel weapon of aggression, and its use immoral and anti-social.

To say this is not to deny the legal right of any man or set of men, voluntarily to refrain from social intercourse or business relations with any persons whom he or they, with or without good reason, dislike. This may sometimes be unchristian, but it is not illegal. But when it is a concerted purpose of a number of persons not only to abstain themselves from such intercourse, but to render the life of their victim miserable by persuading and intimidating others so to refrain, such purpose is a malicious one, and the concerted attempt to accomplish it is a conspiracy at common law, and merits and should receive the punishment due to such a crime.

Examples of such "secondary boycotts" are not wanting in the record of the case before the Commission. A young schoolmistress, of intelligence, character and attainments, was so boycotted, and her dismissal from employment compelled for no other reason than that a brother, not living in her immediate family, chose to work, contrary to the wishes and will of the striking miners. A lad, about 15 years old, employed in a drug store, was discharged, owing to threats made to his employer by a delegation of the strikers, on behalf of their organization, for the reason that his father had chosen to return to work before the strike was ended. In several instances tradesmen were threatened with a boycott—that is, that all connected with the strikers would withhold from them their custom, and persuade others to do so—if they continued to furnish the necessaries of life to the families of certain workmen, who had come under the ban of the displeasure of the striking organizations. This was carrying the boycott to an extent which was condemned by Mr. Mitchell, president of the United Mine Workers of America, in his testimony before the Commission, and which certainly deserves the reprobation of all thoughtful and law-abiding citizens. Many other instances of boycott are disclosed in the record of this case.

In social disturbances of the kind with which we are dealing, the temptation to resort to this weapon oftentimes becomes strong, but is none the less to be resisted. It is an attempt of many, by concerted action, to work their will upon another who has exercised his legal right to differ with them in opinion and in conduct. It is tyranny, pure and simple, and as such is hateful, no matter whether attempted to be exercised by few or by many, by operators or by workmen, and no society that tolerates or condones it can justly call itself free.

Some weak attempt was made at the hearings to justify the boycotts we have been describing, by confusing them with what might be called, for convenience sake, the primary boycott, which consists merely in the voluntary abstention of one or many persons from social or business relations with one whom they dislike. This indeed might amount to a conspiracy at law, if the ingredient of malicious purpose and concerted action to accomplish it were present, but whether this be so or not, the practical distinction between such a boycott and the one we have been reprobating is clear.

It was attempted to defend the boycott, by calling the contest between employers and employees a war between capital and labor, and pursuing the analogies of the word, to justify thereby the cruelty and illegality of conduct on the part of those conducting a strike. The analogy is not apt, and the argument founded upon it is fallacious. There is only one war-making power recognized by our institutions, and that is the Government of the United States, and of the States in subordination thereto, when repelling invasion or suppressing domestic violence. War between citizens is not to be tolerated, and cannot, in the proper sense, exist. If attempted, it is unlawful, and is to be put down by the sovereign power of the State and Nation.

The practices, which we are condemning, would be outside the pale of civilized war. In civilized warfare, women and children and the defenseless are safe from attack, and a code of honor controls the parties to such warfare which cries out against the boycott we have in view. Cruel and cowardly

are terms not too severe by which to characterize it.

Closely allied to the boycott is the blacklist, by which employers of labor sometimes prevent the employment by others, of men whom they have discharged. In other words, it is a combination among employers not to employ workmen, discharged by any of the members of said combination. This system is as reprehensible and as cruel as the boycott, and should be frowned down by all humane men. Happily there was little evidence of its existence among the operators in the anthracite region, one case only having been distinctly proved, and in that the refusal to employ the tabooed men continued but for a short time. Wherever it is practiced to the extent of being founded upon an agreement or concerted action, it, too, comes within the definition of the crime of conspiracy, and as such should be punished. There is also a civil remedy open to one who suffers from having been blacklisted, in an action against those who are a party to it, to recover damages compensatory of the injury received.

The Commission is fully aware of the difficulties inherent in this subject. It is a psychological matter beyond rules and awards unless the lawmaking power of the community fix a penalty upon boycotting and blacklisting. Even then the various degrees to which the two can be carried elude the enforcement of a statute. The Commission is of opinion, however, that there should be a positive utterance on its part relative to discrimination, interference, boycotting, and blacklisting, and this opinion it has put in the form of an award, as follows:

It is adjudged and awarded: That no person shall be refused employment, or in any way discriminated against, on account of membership or non-membership in any labor organization; and that there shall be no discrimination against, or interference with, any employee who is not a member of any labor organization by members of such organization.

THE ANTHRACITE STRIKE COMMISSION ON THE UNITED MINE-WORKERS.

In the issue of March 28 we gave a summary of the report and awards of the Anthracite Strike Commission. The statement of the reasons for deciding against direct recognition of the union are of such importance that we give them below in full:

In the days when the employer had but few employees, personal acquaintance and direct contact of the employer and the employee resulted in mutual knowledge of the surrounding conditions and the desires of each. The development of the employers into large corporations has rendered such personal contact and acquaintance between the responsible employer and the individual employee no longer possible in the old sense. The tendency toward peace and good fellowship which grows out of personal acquaintance or direct contact should not, however, be lost through this evolution to greater combinations. There seems to be no medium through which to preserve it so natural and efficient as that of an organization of employees governed by rules which represent the will of a properly constituted majority of its members, and officered by members selected for that purpose, and in whom authority to administer the rules and affairs of the union and its members is vested.

The men employed in a certain line of work or branch of industry have similar feelings, aspirations and convictions, the natural outgrowth of their common work and common trend or application of mind. The union, representing their community of interests, is the logical result of their community of thought. It encourages calm and intelligent consideration of matters of common interest. In the absence of a union, the extremist gets a ready hearing for incendiary appeals to prejudice or passion, when a grievance, real or fancied, of a general nature, presents itself for consideration.

The claim of the worker that he has the same right to join with his fellows in forming an organization, through which to be represented, that the stockholder of the corporation has to join others in forming the corporation, and to be represented by its directors and other officers, seems to be thoroughly well founded, not only in ethics, but under economic considerations. Some employers say to their employees: "We do not object to your joining the union, but we will not recognize your union nor deal with it as representing you." If the union is to be rendered impotent, and its usefulness is to be nullified by refusing to permit it to perform the functions for which it is created, and for which alone it exists, permission to join it may well be considered as a privilege of doubtful value.

Trades-unionism is rapidly becoming a matter of business, and that employer who fails to give the same careful attention to the question of his relation to his labor or his employees which he gives to the other factors which enter into the conduct of his business makes a mistake, which sooner or later he will be obliged to correct. In this, as in other things, it is much better to start right than to make mistakes in starting, which necessitate returning to correct them. Experience shows that the more full the recognition given to a trades-union the more businesslike and responsible it becomes. Through dealing with business men in business matters its more intelligent, conservative and responsible members come to the front and gain general control and direction of its affairs. If the energy of the employer is directed to discouragement and repression of the union, he need not be surprised if the more radically inclined members are the ones most frequently heard.

The Commission agrees that a plan, under which all questions of difference between the employer and his employees shall first be considered in conference between the employer or his official representative and a committee, chosen by his employees from their own ranks, is most likely to produce satisfactory results and harmonious relations, and at such conference the employees should have the right to call to their assistance such representatives or agents as they may choose, and to have them recognized as such.

In order to be entitled to such recognition the labor organization or union must give the same recognition to the rights of the employer and of others which it demands for itself and for its members. The worker has the right to quit or to strike in conjunction with his fellows, when by so doing he does not violate a contract made by or for him. He has neither right nor license to destroy or to damage the property of the employer; neither has he any right or license to intimidate or to use violence against the man who chooses to exercise his right to work, nor to interfere with those who do not feel that the union offers the best method for adjusting grievances.

The union must not undertake to assume, or to interfere with, the management of the business of the employer. It should strive to make membership in it so valuable as to attract all who are eligible, but in its efforts to build itself up it must not lose sight of the fact that those who may think differently have certain rights guaranteed them by our free Government. However irritating it may be to see a man enjoy benefits to the securing of which he refuses to contribute, either morally, or physically, or financially, the fact that he has a right to dispose of his personal services as he chooses cannot be ignored. The non-union man assumes the whole responsibility which results from his being such, but his right and privilege of being a non-union man are sanctioned in law and morals. The rights and privileges of non-union men are as sacred to them as the rights and privileges of unionists. The contention that a majority of the employees in an industry, by voluntarily associating themselves in a union, acquire authority over those who do not so associate themselves is untenable.

Those who voluntarily associate themselves believe that in their efforts to improve conditions they are working as much in the interest of the unorganized as in their own, and out of this grows the contention that when a non-union man works during a strike he violates the rights and privileges of those associated in efforts to better the general condition and in aspirations to a higher standard of living. The non-union man who does not believe that the union can accomplish these things insists with equal sincerity that the union destroys his efforts to secure a better standard of living and interferes with his aspirations for improvement. The fallacy of such argument lies in the use of the analogy of State government, under which the minority acquiesces in the rule of the majority; but government is the result of organic law, within the scope of which no other government can assume authority to control the minority. In all acts of government the minority takes part, and when it is defeated the government becomes the agency of all, not simply of the majority.

It should be remembered that the trade-union is a voluntary social organization, and, like any other organization, is subordinate to the laws of the land, and cannot make rules or regulations in contravention thereof. Yet it at times seeks to set itself up as a separate and distinct governing agency, and to control those who have refused to join its ranks and to consent to its government, and to deny to them the personal liberties which are guaranteed to every citizen by the constitution and laws of the land. The analogy, therefore, is unsound, and does not apply. Abraham Lincoln said: "No man is good enough to govern another man without that other's consent." This is as true in trade-unions as elsewhere, and not until those which fail to recognize this truth abandon their attitude toward non-union men, to follow the suggestion made above—that is, to make their work and their membership so valuable and attractive that all who are eligible to membership will come under their rule—will they secure that firm and constant sympathy of the public which their general purposes seem to demand.

We believe it is unwise and impolitic to permit boys of immature age and judgment to participate in deciding the policy and actions of a labor union. We think that no one should have such voice in the affairs of a union until he has reached his legal majority. Those affairs are momentous and are of growing importance. They should be directed by men who have a realizing sense of the responsibilities of life, both as to family, as to associates and as to society. This does not mean, of course, that minors should not belong to the union, but they should not act as, nor vote for, delegates to conventions which consider or determine strikes.

The present constitution of the United Mine Workers of America does not present the most inviting inducements to the operators to enter into contractual relations with it. Miners are represented in conventions called for the consideration of strikes; while boys do not go as delegates—only one case having been noted—they send delegates to such conventions; and as the boys in the union in the anthracite region constitute about 20 per cent of the membership, it is easily seen that their representatives, who may be obliged to act on instructions, may have the balance of power, and thus carry a vote for a strike when the more conservative and experienced members might be opposed to it.

Under the recently amended constitution of the United Mine Workers of America, strikes must originate with the locals or districts; but before final action is taken by any district upon questions that directly or indirectly affect the interests of the mine workers of another district, or that require a strike to determine such questions, the president and secretary of the aggrieved district must jointly prepare, sign and forward to the National president a written statement setting forth the grievance complained of, the action contemplated by the district and the reasons therefor; and the National president must, within five days after the receipt of such statement, either approve or disapprove of the action contemplated by the aggrieved district, such approval or disapproval to be made in writing, and a copy for-

warded to the secretary of the complaining district. If the National president approve, the district is free to act; but should he disapprove the contemplated strike the district may appeal to the National Executive Board, which must be convened to consider such appeal within five days after its receipt. Until the National president has approved or the National Executive Board has sustained the appeal, no district is free to enter upon a strike, unless it be general or national, ordered by a national convention.

These provisions give the districts in the anthracite region quite independent powers relative to the initiation of a strike, and their powers are in a measure safeguarded by the necessity of first securing the approval of the National president, or, in case of his disapproval, of the National Executive Board. The difficulty does not lie so much in the method now pursued as in the fact that a strike may be undertaken by a majority vote of the members of a district convention called for the purpose of considering the strike. This is considered a weakness in the present method. Instead of a majority vote there should be at least a two-thirds vote of all the delegates in the convention considering the question of a strike. The vote should be by ballot, and not by voice or show of hands. An amendment to the constitution, making such provisions as those just indicated, and creating a separate anthracite department, so far as strikes are concerned, would remove some of the serious objections that have been urged by the operators.

An independent and autonomous organization of the anthracite mine workers of Pennsylvania, however affiliated, in which the objectionable features above alluded to should be absent, would deserve the recommendation of this Commission, and were it within the scope of its jurisdiction, the demand for collective bargaining and a trade agreement, might then be reasonably granted.

THE ELECTRO-METALLURGICAL PRODUCTION OF IRON AND STEEL.*

The reduction of iron ore and direct production of steel in one operation in the electric furnace is a subject attracting considerable attention at the present time in Europe and America, and a large number of experimental trials with various designs of electric furnace are now being carried out at different centers of cheap electric power in the two continents.

The fall in calcium carbide values in Europe is the chief cause of this activity on the part of electro-metallurgists and electrical engineers in relation to iron and steel production. A large number of carbide plants in France and Switzerland have been compelled, by the unfavorable financial conditions, to cease operating within the last two years; and there is consequently a large aggregate of unutilized water power now awaiting profitable application in these closed carbide works.

If the present attempts to manufacture iron and steel in the electric furnace should be successful, both from the practical and the economic points of view, it will prove a comparatively simple matter to adapt the furnaces in these idle carbide plants to the new manufacture. The Stassano process and furnace are the oldest and the best known of those now being experimented with upon an industrial scale; but Conley, Harmet, Herault, Keller, and Kjellin are other electro-metallurgists who have made a special study of this application of electricity, and have patented processes and furnaces which are now undergoing trial in various places. On account of the importance of the subject, readers will be interested in the following details of the more important of these electric iron smelting processes, and in the critical examination of their future prospects, with which this article closes.

The Conley Furnace and Process.—In this furnace the heating and reduction of the ore are effected by contact of the crushed and well mixed ore and coke, with transverse plates placed in the throat of a conical shaped furnace somewhat similar to the ordinary blast furnace in design. See Fig. 1. A current is passed between the electrodes, sufficient to maintain a red heat, and the hearth of the furnace C is further heated by the bell-shaped ring of plates E. It is estimated that for a Conley furnace of a capacity of 100 tons steel ingots per day 5,000 e.h.p. would be required, and that these ingots could be produced at a cost of $11.84 per ton at the furnace. The patents for the Conley process and furnace are owned by the Electric Furnace Company, of New York, and it has been stated in print that this company is now engaged in erecting an 8,000 horse-power plant at Elizabethtown, N. Y. The Massena Electric Steel Company has also been formed, to erect and work a similar plant at the new water power center, Massena, N. Y.

The Harmet Furnace and Process.—The Harmet furnace is shown in sectional elevation in Fig. 2. It is divided into three distinct parts—all electrically heated by suitably arranged carbon electrodes. The ore is charged into the inverted cone-shaped furnace *a*, and passes from the inclined hearth of this into the hearth of B, where it meets the coal or coke necessary for its reduction. The molten iron or steel flows from the hearth of B into the refining furnace C, and after the requisite heating is tipped into the ladle D. The hot gases from B are drawn into A by air injection at E, and these assist in bringing the contents of A to the smelting temperature. According to the inventor, 3,600 electric horse-power hours are required to produce one ton of steel, and the estimated cost of producing this quantity with the Harmet furnace is only $5.60 per ton. The furnace is reported to be in successful operation at St. Etienne, in France.

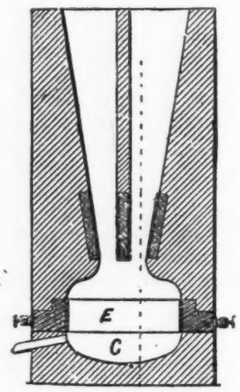


Fig. 1

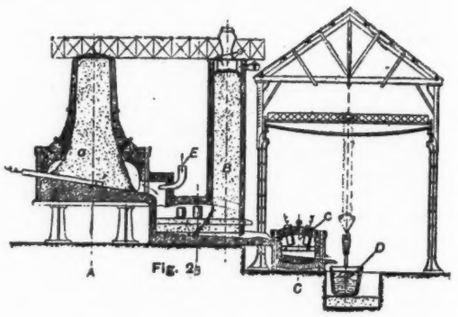


Fig. 2

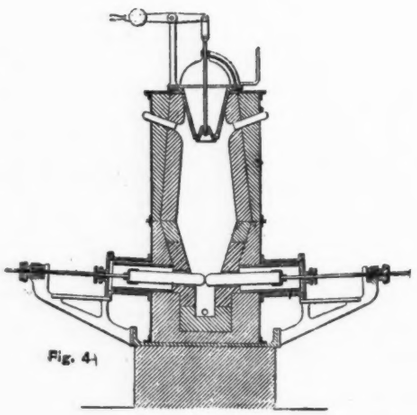


Fig. 4

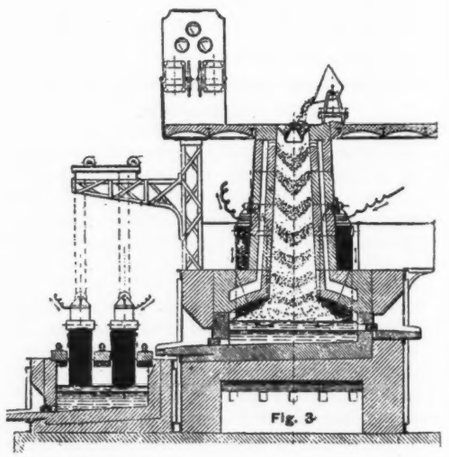


Fig. 3

ELECTRIC SMELTING FURNACES.

The Keller Furnace and Process.—This furnace is based upon the blast furnace principle of construction and work, and both resistance and arc heating are employed. Fig. 3 is a sectional elevation of the smelting and refining furnaces, and this figure requires no detailed explanation. An experimental plant is now in operation at Kerrousse, Morbihan, France, where 550 horse-power is available. According to the statements of the inventor, one metric ton of steel can be obtained in the Keller type of furnace with an expenditure of 2,800 kilowatt-hours of electric power, and the cost per ton is estimated to lie between $17.50 and $19.20. The furnace originally in use at the Kerrousse works absorbed 375 horse-power, but this is being replaced by a larger furnace, which will produce 15 to 20 tons of steel at one charging. New Zealand iron sand from Taranaki is reported to be used as raw material at Kerrousse, and the developments at this place are controlled by the Compagnie Electrothermique Keller Leleux et Cie., which is exploiting the Keller patents.

The Kjellin Furnace and Process.—The Kjellin process is reported to be in successful operation at the Gussingen foundry in Sweden, but no details of the furnace construction or of the method of working are at present forthcoming. The small furnace first erected is, however, stated to have yielded good results, and according to a United States consular report, a 300-h.p. furnace is now in course of erection, and an output of 1,500 tons steel per annum is expected.

The Stassano Furnace and Process.—The Stassano furnace is the oldest of the electric furnaces for the smelting of iron ores, and has received the most extended trials. Fig. 4 shows the earlier type of furnace, and Fig. 5 the latest form of furnace in sectional elevation. The chief feature of the Stassano furnace is the use of the electric arc for smelting the prepared briquettes, containing the ore, flux, and reducing agent. In the latest form of furnace —Fig. 5—this is combined with a revolving hearth. The carbon electrodes A, which are water jacketed, revolve with the hearth, and the electrical contacts are arranged for by sliding brushes at B, C. The axis of the furnace is not vertical, but is inclined, in order to give a mixing action to the molten materials

* From the London *Engineer*, March 13, 1903.

lying on the hearth as this rotates. The ores treated in the Stassano furnace are previously crushed, and formed into briquettes with the calculated weight of coke or anthracite, and flux, and some suitable binding material. The Stassano furnace and process was first tried at Rome in 1899, and as these experimental trials gave favorable results, a plant capable of utilizing 1,500 horse-power was erected at Darfo, in Northern Italy, in 1900. An output of 4,000 tons of steel per annum was expected from this works. In June, 1901, Goldschmidt visited the Darfo Works, and reported that they were operating successfully. The only published figures for the yield of the Stassano furnace are based on the earlier trials at Rome, and show a consumption of 2,700 electrical horse-power hours per ton of steel. The cost of operating the process in Italy, where the cost of fuel is unusually high, is given as $19.20 per ton of steel. This is claimed to be a saving of $11.50 per ton over the older method of manufacturing steel by the usual blast furnace methods.

Other Types.—At La Praz, in France, and at Neuhausen, in Switzerland, other types of electric furnace for iron production are also being tried on an industrial scale. Details of these furnaces are not available for publication.

Conclusions.—As regards the future of these electric methods for smelting iron and producing steel, the figures for power consumption, and the estimated costs per ton of steel given by the various inventors, have been gathered, and are presented in tabular form below:

Name.	Electrical horse-power hours per ton of steel.	Total costs per ton of steel.
Conley	1200	$11.84
Harmet	3600	5.60
Keller	3800	18.38
Kjellin	1580	....
Strassano	2700	19.20

It is evident that upon such data, no very reliable opinion as to the future of the electric processes can be based. The Harmet process, consuming 3,600 electrical horse-power hours per ton of steel, shows a total operating cost less than one-half of that of the Conley process, while using three times the amount of electric power. Discarding these cost figures, therefore, as unreliable, we are compelled to study the electric processes wholly from the general and practical standpoint.

In all the electric iron-smelting processes the actual reduction of the ore is effected by the coke or other carbonaceous matter with which it is mixed, and an addition of lime or other fluxing compound is also required, in order to obtain a slag that will become fluid at the temperature of the furnace. Therefore the saving of fuel when using the electric furnace does not amount to much more than 1,050 lbs. per ton of iron or steel produced. In the ordinary blast furnace, worked under the best conditions, one ton of iron can now be produced with 1,800 lbs. of coke—and 1,400 lbs. of this total represent that required for combining with the oxygen of the ferric-oxide in the ore.

The average price of coke in this country is, say, $5.25 per ton, and the actual saving effected by substituting electricity for coke as heating agent is only $2.50 per ton of iron produced. This sum would, therefore, have to cover the cost of the electric power, and also of the briquette making, required by most of the electric furnace processes. Taking the lowest power consumption per ton of steel given in the above tabulated statement, namely, 1,200 electric horse-power hours for the Conley process, this represents electric power at 0.2c. per electric horse-power hour, or $18.24 per electric horse-power year of 8,760 hours. For the Stassano process it would represent electric power at less than one-half of the above costs, or at $8.20 per electric horse-power year. These calculations show that even when no special crushing of the ore and mixing with the fluxing, reducing and binding materials is required, as a preliminary to the operation of the electric furnace processes, competition with the ordinary blast-furnace procedure is improbable. When briquette making is first required, the position of the electric furnace processes would appear to be hopeless.

In countries where fuel is very expensive, water power abundant, and the necessary raw materials are found, these processes may have a limited field of usefulness; but their development, even under these favoring conditions, will be dependent upon the enforcement of high tariff duties on imported iron and steel, and upon a brisk home demand for these metals. In the iron smelting industry of those countries favored with extensive coal-fields and a cheap supply of fuel, the blast furnace will still easily hold its own. It will not be until coal and coke have become much more costly than they are to-day that electric furnaces will displace the blast furnace—a type of furnace which is the most perfect fuel-consuming apparatus in general use, and is estimated to possess a thermal efficiency of over 70 per cent.

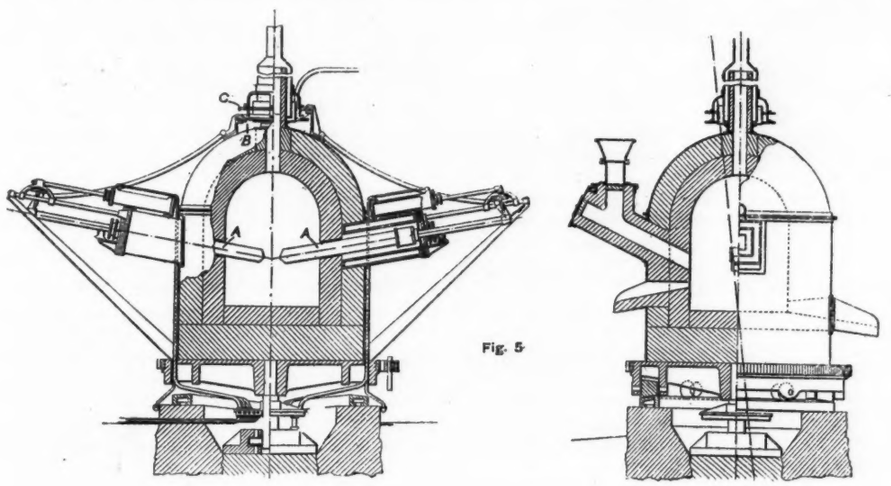


Fig. 5

STASSANO ELECTRIC SMELTING FURNACE.

HOISTING ACCIDENTS IN NORTHUMBERLAND.—The Northumberland Miners' Association in England, has made a demand on the coal operators for the employment of two men, to be on duty in every engine-room during the time men are going down or coming up the shafts. This has been done in view of the number of hoisting accidents which have occurred recently. The Coal Owners' Association, however, refused the request, claiming that a division of responsibility would really increase the danger.

THE CHEMISTRY OF ORE DEPOSITION.*

By Walter F. Jenney.

The following table of comparative reducing powers gives the quantitative value, or gross amount, of the work done by each of the deoxidizing agents. It is necessary, however, to supplement these theoretic results by observations in the field, especially of ore-deposits undergoing decomposition and reformation; and also by experimental research in the laboratory, in order to estimate accurately in each particular instance the chemical energy, or velocity with which the action takes place.

The Relative Reducing Power, R, or Duty, of Equal Weights of the Organic and Inorganic Mineral Substances Usually Occurring in the Ore-Bodies, or in the Wall-Rock, or Introduced with the Circulating Waters; Hydrogen Being Assumed as 100.

	R.
Hydrogen (occurs combined with carbon), oxidized to H_2O	100.00
Marsh-gas, CH_4 (carbon 75 per cent., hydrogen 25 per cent.), oxidized to $H_2CO_3+H_2O$	50.00
Petroleum, $C_n H_{2n+2}$ (carbon 85 per cent., hydrogen 15 per cent.)	43.36
Bitumen (carbon 89 per cent., hydrogen 11 per cent., oxygen 0 per cent.)	40.67
Bitumen (carbon 80 per cent., hydrogen 14 per cent., oxygen 6 per cent.)	39.92
Bitumen (grahamite) (carbon 81 per cent., hydrogen 10 per cent., oxygen 9 per cent)	35.88
Bituminous Coal (carbon 88 per cent., hydrogen 7 per cent., oxygen 5 per cent.)	35.71
Bituminous Coal (carbon 81 per cent., hydrogen 4 per cent., oxygen 15 per cent.)	29.13
Carbon (graphite, etc.), oxidized to CO_2	33.33
Carbon, oxidized to CO	16.67
Lignite (carbon 73 per cent., hydrogen 7 per cent., oxygen 20 per cent.)	28.83
Lignite (carbon 60 per cent., hydrogen 4 per cent., oxygen 36 per cent.)	19.50
Native Humus Acid, $C_{48}H_{40}O_{28}$ (carbon 55 per cent., hydrogen 5 per cent., oxygen 40 per cent.)	18.04
Sulphur (combined), oxidized to SO_4	25.00
Sulphur, oxidized to SO_3	18.75
Sulphur, oxidized to SO_2	12.50
Sulphuretted Hydrogen, H_2S, oxidized to H_2SO_4	23.53
Sulphuretted Hydrogen, H_2S, oxidized to H_2O+S	5.88
Pyrite and Marcasite, FeS_2 (oxidation of Fe to $Fe_2O_3 3H_2O$; and S to SO_2)	12.50
Pyrite and Marcasite, oxidation to $FeSO_4$	11.67
Pyrite and Marcasite, oxidation to $FeSO_4$ and S	6.67
Pyrrhotite, $Fe_{11}S_{12}$, oxidized to $FeSO_4$ and H_2SO_4	9.40
Enargite, Cu_3AsS_4, oxidized to As_2O_5, $CuSo_4$ and H_2SO_4	8.90
Chalcopyrite, $CuFeS_2$, oxidized to $CuSO_4$ and $FeSO_4$	8.72
Covellite, CuS, oxidized to $CuSO_4$	8.39
Blende, ZnS, oxidized to $ZnSO_4$	8.25
Arsenopyrite, FeAsS, oxidized to As_2O_5 and $FeSO_4$	7.98
Calcium Disulphide, CaS_2, oxidized to $CaSO_4$ and S	7.69
Stibnite, Sb_2S_3, oxidized to Sb_2O_3 and H_2SO_4	7.15
Carbon Monoxide, CO, oxidized to CO_2	7.14
Bornite, Cu_3FeS_3, oxidized to Cu_2SO_4, $CuSO_4$ and $FeSO_4$	7.01
Arsenic, oxidized to As_2O_5	6.67
Tetrahedrite, $4Cu_2S.Sb_2S_3$, oxidized to Cu_2SO_4, $CuSO_4$ and Sb_2O_3	6.39
Iron, oxidized to Fe_2O_3	5.36
Iron, oxidized to Fe_3O_4	4.76
Iron, oxidized to FeO	3.58
Chalcocite, Cu_2S, oxidized to Cu_2SO_4	5.04
Galena, PbS, oxidized to $PbSO_4$	3.35
Tellurium, oxidized to TeO_2	3.20
Copper, oxidized to CuO	3.15
Copper, oxidized to Cu_2O	1.58
Antimony, oxidized to Sb_2O_3	2.50
Rhodochrosite, $MnCo_3$, oxidized to MnO_2	1.75
Siderite, $FeCo_3$, oxidized to Fe_2O_3	0.86
Ferrous Sulphate, $FeSO_4$, oxidized to $Fe_2(SO_4)_3$	0.66
Magnetite, Fe_3O_4, oxidized to Fe_2O_3	0.46

Fortunately, with respect to the greater number of the more important reducing substances commonly occurring in ore-deposits, the gravimetric power, or duty, and the chemical energy run nearly parallel; so that one may be taken as the measure of the other.

The results of these calculations confirm the observations made in the zinc and lead mines of the Joplin, Mo., region, in the investigation of the secondary formation of the ores, of the relative order of the reducing powers of the principal deoxidizing agents, viz.: 1, bitumen; 2, bituminous coal and carbonaceous shales; 3, marcasite and pyrite; 4, blende; 5, galena.

Ferrous sulphate appears to be exceptional; notwithstanding the extreme low duty (0.66), and notwithstanding that, in forming ferric sulphate, 19.1 parts of the salt combine with only one part of oxygen, yet in the zone of oxidation, where the chemical activities have full play in the breaking-up of an ore-body, it fulfills a special mission, at once oxidizing and reducing. Its chemical energy is such that it reduces cuprous oxide to the metallic state;

* Abstract from a paper read before the American Institute of Mining Engineers.

a change which none of the other deoxidizing agents usually found in ore-bodies are able to accomplish.[1] Further, its field of operation is the zone of oxidation and that border-land where the zone of oxidation merges into the zone of reduction.

This low quantitative-value is in many instances more than offset by the large amount of ferrous and ferric sulphates continuously supplied by the progressive oxidation of the pyrite in the ore-deposits. The mine-waters lixiviating the decomposing ore, although the volume of the flow may be considerable, are frequently strongly acid from the free sulphuric acid and iron sulphates held in solution.

In conclusion, the hydrocarbons, combining the highest quantitative deoxidizing power with an intense chemical activity, are the most powerful of all reducing agents. The action of the solid oxygenated hydrocarbons, bitumen, bituminous coal, and the lignitic matter finely disseminated in shales, is greatly accelerated by the facility with which these carbon-compounds, when in powder, are carried by the circulating waters into every part of the ore-bodies.

IRON AND STEEL EXPORTS AND IMPORTS.

Exports of iron and steel—including machinery—from the United States for the two months ending February 28, are valued by the Bureau of Statistics of the Treasury Department at $14,360,503, against $15,454,353 for the corresponding period in 1902; showing a decrease of $1,093,850, or 7.6 per cent.

The chief items of these exports are shown in the table below, in long tons:

	1902.	1903.	Changes.
Pig iron	9,696	2,307	D. 7,389
Billets and ingots	364	354	D. 10
Bars	5,231	6,437	I. 1,206
Sheets and plates	1,553	1,520	D. 13
Rails	20,588	622	D.19,966
Structural steel	15,053	5,813	D. 9,240
Wire	14,671	14,016	D. 655
Nails	4,866	5,076	I. 210

The only increases shown are in bars and nails. It should be remembered that this year's exports are compared with a period when the trade had already decreased largely as compared with 1901 and 1900. The exports of pig iron, billets and rails have fallen to a point where they can be practically neglected.

Exports of iron ores for the two months were 1,113 tons, against 316 tons last year; an increase of 797 tons.

The total value of iron and steel imports for the two months is given at $8,260,491, against $3,718,950 for the corresponding period in 1902; an increase of $4,541,541. The chief items of these imports were, in long tons:

	1902.	1903.	Changes.
Pig iron	16,190	155,866	I. 139,676
Scrap iron and steel	4,034	17,053	I. 13,019
Ingots, billets and blooms	7,586	58,842	I. 51,256
Tin-plates	13,275	9,324	D. 3,951

The reasons for the increase in raw iron and steel are well understood. They are found in the extraordinary demand for materials here.

Imports of iron ore for the two months were 131,703 tons, against 137,027 tons last year; a decrease of 5,324 tons, or 4.0 per cent. This ore came chiefly from Cuba.

MINERAL PRODUCTION OF TENNESSEE.

We are indebted to Mr. R. A. Shiflett, Commissioner of Labor, Statistics and Mines, for the following figures of the mineral production of Tennessee, in advance of the publication of his full report:

Barytes.—In 1902 there were 3,255 short tons of barytes produced. Only one mine was operated during the year. There were 26 men employed, at average wages of $1 per day. There are mines at Cleveland, Sweetwater and Madisonville; also at Sinking Springs, in Sevier County, and a larger production is expected this year.

Iron Ore.—The output in 1902 included 300,627 tons of brown hematite and 288,243 tons of red hematite; a total of 588,870 long tons. The average number of employees at the mines was 1,425.

Phosphates.—The total production of phosphates in the State in 1902 was 454,078 long tons. The total value was $1,341,161, an average of $2.95 per ton at mines. The average number of men employed was 2,985; the average wages paid were $1.14 per day. Of these 2,700 were in the Mount Pleasant field.

Of the phosphate mined, 347,078 tons came from the Mount Pleasant region. Of this 105,530 tons were exported. The average prices realized in this field were $2.90 per ton for phosphate rock shipped to domestic points, and $3.25 for rock exported.

[1] "Enrichment of Gold and Silver-Veins," by Walter H. Weed, *Transactions*, xxx, 431. *Genesis of Ore-Deposits*, p. 480.

NEW RAILROADS IN SIBERIA.—Several branches and additions to the Silberian Railroad are being surveyed, and the Government has made appropriations for some of them. The most important is the Baikal Division of the main line, which is to run around the southern end of Lake Baikal, from Irkutsk to a connection with the Trans-Baikal Division, avoiding the transfer by boat across the lake, which is now in use. Branches are also proposed to Barnaul and to Semipalatinsk. On the Pacific end a line is to be built from the Soochau coal mines to Nahodka Bay, and also a line from the Ussuri Railroad to the same mines, to facilitate transportation to Vladivostok.

ABSTRACTS OF OFFICIAL REPORTS.

Horn Silver Mining Company, Utah.

The report of this company covers the year 1902. The financial statement shows receipts from sales of ore, $109,707; stove fund, interest, etc., $7,001; total, $116,708. Charges were, for mining, $90,595; milling, $11,192; miscellaneous, $3,766; general expenses, $31,853; total, $137,406; leaving a deficit of $20,698 for the year. The balance carried forward from 1901 was $87,448, leaving a surplus of $66,750 at the close of 1902; of which $8,047 was in mine supplies, and $58,703 in cash.

The ore statement shows 12,159 tons mined, of which 4,549 tons were shipping ore and 7,610 tons milling ore. The milling ore was concentrated, the result showing 1 ton of concentrates to 4.8 tons crude ore. The milling cost, per ton of crude ore, was: Labor, $0.935; supplies, fuel, etc., $0.536; total, $1.471. The cost of mining all ore is reported as follows:

	Amount.	Per ton.
Labor on ore	$37,446	$3.079
Labor on dead work	13,439	1.105
Labor on surface	20,780	1.709
Supplies, timber, fuel, etc.	18,930	1.557
Total	$90,595	$7.450

In mining 1,248 poles and 229,748 ft. timber were used. There were 15,581 mine cars, and 5,787 tanks water hoisted. The fuel consumed in mine and mill included 764 tons coal and 2,430 cords wood. The ore shipments and sales were as follows:

	Net tons.	Value.	Per ton.
First-class crude ore	2,990	$41,644	$13.93
Lease ore	142	2,320	16.34
First-class copper ore	1,311	35,397	27.00
Concentrates	1,497	27,583	18.43
Total	5,940	$106,944	$18.00

The contents of the ore shipped were: Gold, 203 oz.; silver, 112,813 oz.; lead, 3,657,062 lb.; copper, 717,353 lb. The total exploration work was 1,031 ft., in drifts, cross-cuts and winzes.

Manager P. T. Farnsworth's report says: "The 400-ft. level, south, has been extended 225 ft. along the foot-wall. This level encountered low-grade ore and some zinc. From the 400-ft. level an upraise was driven to the 350-ft. level. This raise was driven in ore—mainly mill ore. The 350-ft. level, south, was driven from the above upraise south along the footwall of the vein 159 ft. This entire level was driven in a good grade mill ore, showing several bunches of first-class shipping ore. The last 12 ft. of this level are all in a good grade zinc ore. On the northern end of the 350-ft. level an upraise was driven to the 300-ft. level. This raise encountered a good grade mill ore and some first-class shipping ore. On the south end of the 350-ft. level we are now driving a raise, which throughout shows a very good grade of shipping ore. These ore bodies encountered in the above workings belong to the south fault ore system, or the same system from which in the 600, 700, 800 and 900-ft. levels enormous quantities of lead, silver and copper ores were extracted, and in which the great zinc ore bodies of the Horn Silver Mine were developed. From the 400-ft. level to the surface the south fault ore system is all virgin ground; we are developing it as fast as possible. The ground is easily mined, but it is very heavy and loose, and therefore requires close attention and careful timbering. I have every reason to believe that this ground from the 400-ft. level to the surface along the south fault ore system will develop ore bodies similar to those found and extracted from the 600, 700, 800 and 900-ft. levels on the same system; and I furthermore believe that we will find large quantities of first-class zinc ore in this portion of the mine. . . . Conditions in the north portion of the mine, in all the levels, remain the same as reported last year.

"So far I have been unable to enter into reasonable contracts for our lead, silver and copper ores with the various smelters of this State, but I have assurances that we may be able to do so soon."

Le Roi Mining Company, Limited, British Columbia.

The report of this company, which has been much delayed in publication, covers the year ending June 30, 1902. The accounts, as stated in sterling from the London office, show that the sales of matte amounted to £385,521, ores and matte on hand, £218,571; other receipts for rent, etc., were £2,397, making a total of £606,489. The deduction shows £124,201 cost of ore production; £387,967 for expenses at smelter; £118,904 for ores and matte on hand at the beginning of the year, and £21,969 for interest and miscellaneous expenses, making a total of £653,041, and showing a debit balance of £46,551 for the year.

The important part of the report is the review of operations by the general manager, Mr. John H. Mackenzie. He reviews previous estimates of ore on hand, and comes to the conclusion that the reserves at the close of the year amounted to 447,358 tons of an average value of $9.96. The second class dump contains 84,000 tons of an average of $7.50 per ton, and there is an addition of 3,000 tons estimated at $12.50 per ton.

The mine was operated only 263 days, over three months having been lost by the strike of the miners. The ore mined and shipped to the Northport Smelter was 155,765 dry tons, averaging 0.373 oz. gold, 0.709 oz. silver, and 1.526 per cent copper. The gross value was $1,821,773, equal to $11.70 per ton. There were also shipped 14,333 tons of ore from the dump, having a gross value of $147,517, or $10.29 per ton. A plan of the mine accompanies the report which is reproduced herewith. The location and area of the ore taken out in 1902 is shown by heavy black lines on the plan.

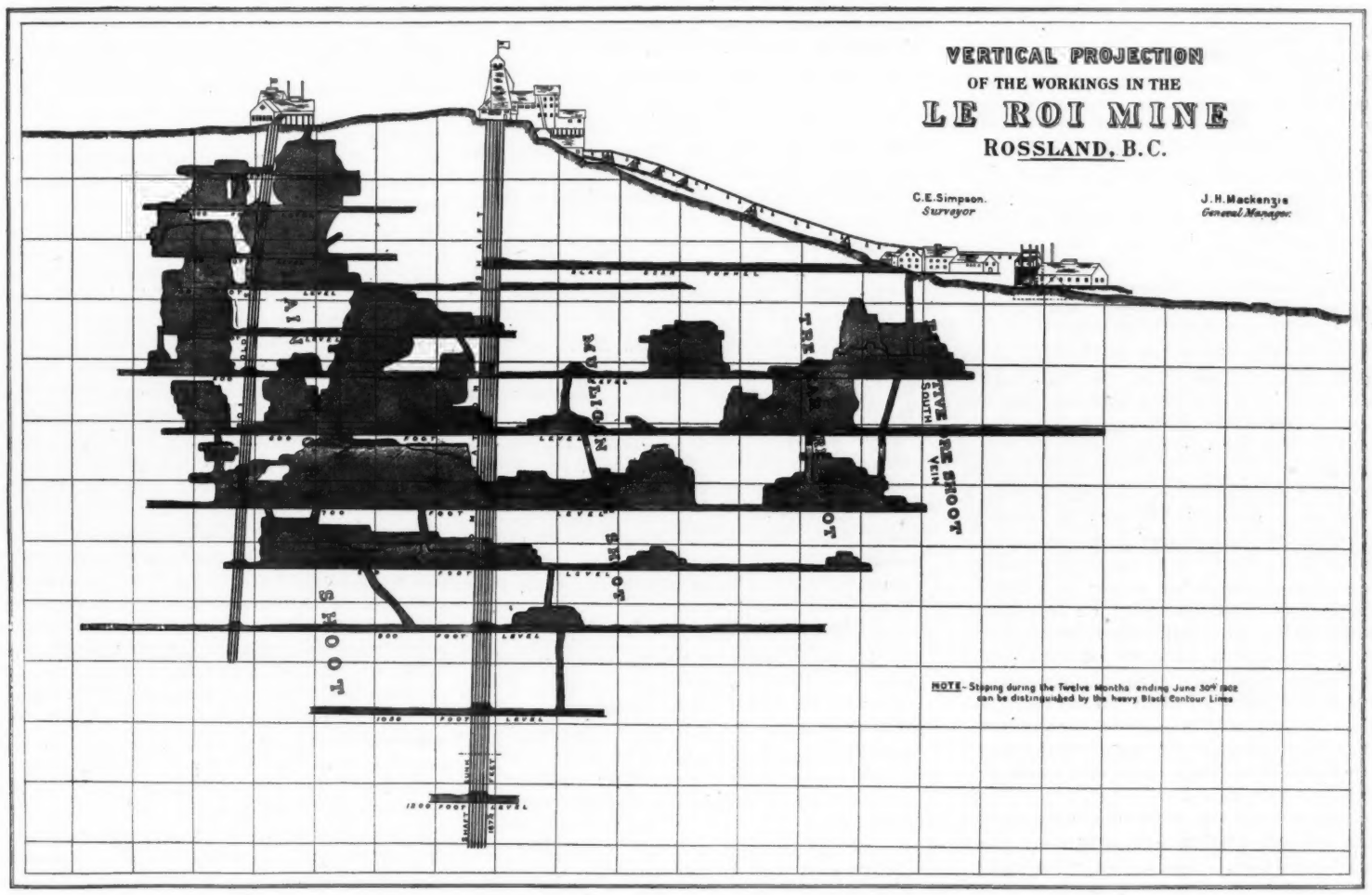
The cost of mining and smelting was reduced during the year, although a large amount paid for exploration work was charged in the accounts. Mr. Mackenzie believes that there is no doubt that the working costs can be cut very considerably from the present amount. The costs per ton for 1901 and 1902 are shown in the following table:

	1901.	1902.
Stoping and loading on railroad	$3.487	$3.100
Exploration	.423	.451
Depreciation:		
Mine equipment	.080	.138
Surface improvements	.050	.061
Mine machinery	.106	.125
Freight on ore to smelter	.510	.400
Smelter expense	4.465	4.205
Depreciation of smelter plant	.232	.119
Interest and discount on ore in yard and matte in transit	.229	.233
Freight on matte to refiners	.536	.404
Sacking and crushing matte	.044	.043
Eastern representation, assaying, etc.	.028	.013
Refiners' tolls and deductions	.534	.579
Metal losses in smelting	...	.781
Total	$10.724	$10.652

The total development work done during the year was 3,123 ft. The cost of shaft sinking per lineal

foot was $106.99, of cross-cutting, $18.92, and of drifting, $16.95. The expenditures as reported by the manager include $487,010 for mining ore, and $106,887 for new construction development and additions to mining machinery and plant.

The Northport Smelter owned by this company is at Northport, Washington, 17 miles from the mine with a railroad connection. The location is good, as the smelter has an abundant supply of water, and an unlimited quantity of limestone for flux is accessible. Coke can also be obtained at a reasonable rate. The plant has 6 large water-jacket copper matting furnaces, 3 calcining furnaces, with other


VERTICAL PROJECTION
OF THE WORKINGS IN THE
LE ROI MINE
ROSSLAND, B.C.
C.E. Simpson.
Surveyor
J.H. Mackenzie
General Manager
NOTE - Stoping during the Twelve Months ending June 30th 1902 can be distinguished by the heavy Black Contour Lines

necessary machinery. Its capacity is 1,500 tons of ore a day. The operation last year was interrupted, to some extent, by the strike increasing the costs. The working expenses were $1,194,568, and new machinery and improvements cost $122,281. The works shipped 6,779 tons of matte, having a net value of $2,532,303. The total ore smelted was 265,761 tons, of which 56,074 tons were brought from the Le Roi No. 2 and Rossland Great Western. This purchased ore brings no profit to the smelter.

Referring to the financial condition of the company, Mr. Mackenzie says that while the company commenced the year with an apparent surplus, and made a profit of $233,290, the books show a deficiency at the close of the year, as stated above. This was due to overestimate of the stock of metals on hand; the failure to allow for losses of copper and silver in slags; to fall in the prices of metals and to heavy expenditure on new work and improvements. With regard to the reports transmitted to the London office, he says:

"The fall in the price of metals has reduced the estimates which have been made concerning our profits very greatly, possibly to the extent of $80,000—the exact figures are imposisble to ascertain. To make this statement clear, I should explain that by reason of the fact that the actual market value of our ores cannot be learned until they reach the hands of the refiners in the shape of matte it is impossible to estimate our profits over a given period with any degree of accuracy. For the purposes of the monthly reports which are transmitted to the London office, and for the settlements made between the mine and smelter, the practice has been followed of placing a value on the monthly outputs on the metallic basis prevailing during the month in which the ore is mined. This procedure, apparently the only one which could be pursued under the circumstances, operates satisfactorily when copper and silver prices remain comparatively steady; but when fluctuations, such as have taken place several times during the past year, occur, profits are metamorphosed into actual losses. According to the showing made by our ore books, the profit of $233,290, previously referred to, has been made on the first-class ore mined and the second-class ore treated, basing our estimates in the manner indicated, when, as a matter of fact, the matte settlements, made about three months after the receipt of the ore at the smelter, at the market prices then prevailing were approximately $50,000 less. An additional sum of $30,000 may be said to have been lost on the sales of custom ores, owing to the fall in prices.

"The capital expenditures on the company's smelter shows that over $117,000 have been spent during the year in various ways. The installation of blast furnace No. 6, completion of the calcine furnace, etc., the purchase of the steam shovel, additional boilers and sampling mill machinery, etc., are responsible for nearly one-half of this sum, while the balance was expended in the purchase and installation of pumps, etc., used in connection with the water and fire protection system, buildings erected at the time of the strike for the accommodation of the employees, installation of a sewage system, etc., and in connection with the electrical machinery for the tramway. The money expended at the mine on machinery and plant and surface improvements was comparatively small, amounting to less than $13,000. Half of the amount was spent in the construction of a flume and in making additional improvements in connection with our water and fire protection system, while the remainder of the sum was expended in the erection of or additions to buildings and in the purchase of additional machinery."

Tamarack Mining Company, Michigan.

The report of this company covers the calendar year of 1902. It differs from preceding reports of the company in one important point, which is the submission of statistics of production and costs.

The financial statement shows assets as follows: Cash, accounts receivable and copper on hand, $635,148; supplies at mine, $275,195; wood and timber lands, $259,135; Hancock & Calumet Railroad bonds, $99,000; Mineral Range Railroad stock, $250,000; Lake Superior Smelting Company stock, $100,000; total, $1,618,478. The liabilities, including bills and accounts payable, were $1,036,512, leaving a balance of $581,965. The statement of earnings and expenses for the year is as follows:

	Total.	Per lb. Copper.
Copper sales	$1,894,321	11.87
Interest, etc.	47,586	0.30
Total receipts	$1,941,907	12.17
Running expenses at mine	$1,518,045	9.51
Smelting, freight, etc.	226,554	1.42
Construction expenses	154,878	0.97
Total expenses	$1,899,477	11.90
Balance, profit	$42,430	0.27

The balance brought forward from 1901 was $539,535, making a total surplus of $581,965 at the close of the year, as above.

The statement of comparative results for 1901 and 1902 is as follows:

	1901.	1902.
Tons rock mined	773,783	837,568
Tons rock hoisted	688,622	763,209
Tons rock stamped	626,905	658,720
Pounds mineral obtained	29,998,094	25,747,931
Percentage refined copper in mineral	60.006	61.991
Pounds refined copper per ton of rock hoisted	26.1	20.9
Pounds refined copper per ton of rock stamped	28.7	24.2
Product fine copper, lbs.	18,000,852	15,961,528
Cost of mining per ton of rock	$1.97	$1.81
Cost of min'g per ton of rock stamped	$2.44	$2.30
Cost of stamping per ton hoisted, cts.	22.72	20.109
Cost of stamp'g per ton stamped, cts.	24.953	23.299

The superintendent's report shows that the new work for the year was 256 ft. of shaft sinking; 8,469 ft. driving on the Conglomerate; 741 ft. driving on the Osceola Amygdaloid; 5,004 ft. cross-cutting and 1,440 ft. winzes. The depths of the shafts

on the property at the close of the year were as follows: No. 1, 3,408 ft.; No. 2, 4,356 ft.; No. 3, 4,892 ft.; No. 4, 4,450 ft.; No. 5, 4,938 ft.

The work of opening the territory tributary to No. 5 shaft was pushed during the year, and some good stoping ground was met with, but upon the whole, the product from the territory thus opened has been below the average of other parts of the mine. There is still much untouched ground on this part of the property, and some improvement may be shown. Owing to the limited production of stamping-rock from this shaft, the cost of production was higher than from other portions of the mine, thus increasing the general average of the property. At No. 3 shaft, good copper-bearing ground has been opened by exploration, and at No. 2 shaft preparations have been made to open up a large extent of the reserve ground.

No. 2 shaft needs repairs, but the work of hoisting could not be interrupted long enough to make the thorough overhauling which was needed.

The large compressor and hoist for No. 5 shaft have not yet been received, in consequence of the delay at the manufacturers and the machinists' strike. The old equipment did very good work, however, and has lasted fairly well up to the present time. The principal construction expense for the year was incurred to complete the equipment work at this shaft.

The mill was run without interruption during the year, and the results have been very satisfactory. The cost of stamping was lower than has been obtained for several years, although prices for labor and supplies were generally higher.

The directors' report says: "The directors can add very little to the report of our late superintendent, Capt. William E. Parnall. The only matter seeming to call for special comment is the development tributary to No. 5 shaft. It is unfortunate that the rock coming from this portion of our mine has not shown the copper contents which we had hoped. As pointed out by our superintendent, however, the amount of development work so far done, while quite extensive, is yet very small in comparison to the large area of ground tributary to the shaft, and we shall continue to push development here as rapidly as possible. Meanwhile, the large reserves opened up in the past will still furnish us with ample rock of our present grade to maintain production.

"The most serious loss which this company has sustained, and one which will be long felt, is that of the death of Capt. Parnall. His value to this company cannot be overestimated, and it is saying very little to attribute to him the present development of our property. Taking up the management where it had been left at the retirement of Capt. Daniell, whose brain conceived the inception of the company, he has proved a worthy successor, and he pushed the work forward with an insight into the future which was little less than marvelous."

Aetna Consolidated Quicksilver Mining Company, California.

The report for the year 1902 shows receipts from interest, etc., $1,742; balance from previous year, $60,712; total, $62,454. Operating expenses—including $15,211 for development work—were $21,888, leaving a balance of $40,566 at the close of the year.

No quicksilver was produced. There were 690 ft. of drifts and tunnels run and 706 ft. old tunnels re-opened.

The report says: "Work during the year has been largely directed to opening up No. 5 level, and we have been successful in finding the ore-body which was shown in No. 2 level last year, extending down, and showing quite as well. A raise has been carried up from No. 5 level to No. 2 level, and all preparations made for stoping out the ore. The next move is to push in No. 7 level, and, from appearances at No. 5, the chances are good that it will continue down to that depth or even lower. The furnace is being put in thorough repair, and we expect early in the present year to have it running on the ore."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the Engineering and Mining Journal.

The Blue Goose. By Frank Lewis Nason. New York; McClure, Phillips & Co. Pages, 296. Price, $1.50.

Storage Battery Engineering. By Lamar Lyndon. New York; the McGraw Publishing Company. Pages, 360; illustrated. Price, $3.

Jahrbuch der Kaiserlich-Koniglichen Geologischen Reichsanstalt. Volume LI, Parts 3 and 4. Vienna, Austria; R. Lechner. Pages, 420.

Etudes des Phenomenes Volcaniques. By Francois Miron. Paris, France; Ch. Beranger. Pages, 320; illustrated. Price (in New York), $3.50.

Annual Report of the United States Life Saving Service, 1902. Sumner I. Kimball, General Superintendent, Washington; Government Printing Office. Pages, 476.

Canada. Report of the Superintendent of Mines, 1902. Dr. Eugene Haanel, Superintendent, Ottawa, Canada; Government Printer. Pages, 56; with maps and illustrations.

Notes on Southwestern Utah and Its Iron Mines. By G. C. Hewett. Denver, Colo.; published by the Colorado Scientific Society. Pamphlet, 12 pages; illustrated.

Abstract of the Twelfth Census of the United States. 1900. William R. Merriam, Director of the Census. Washington; Government Printing Office. Pages, 396.

Mineralogical Notes on Western Australian Tellurides. By L. J. Spencer. London, England; Reprinted from the *Mineralogical Magazine*, February, 1903. Pamphlet, 24 pages.

British Guiana. The Mining Ordinance No. 1, of 1903; with Mining Regulations, 1903. Collated with the Official Records. Georgetown, Demerara; Government Printer. Pages, 108.

Industrial Conference Under the Auspices of the National Civic Federation. Held in New York, December 8-10, 1902. New York; published by the Federation; Ralph M. Easley, Secretary. Pages, 372.

State Geological Survey of North Dakota. Second Biennial Report, 1901-1902. Dr. Frank A. Wilder, State Geologist. Bismarck, N. Dak.; published for the Survey. Pages, 262; with maps and illustrations.

United States Geological Survey. Monograph XLIII. The Mesabi Iron-Bearing District of Minnesota. By Charles Kenneth Leith. Washington; Government Printing Office. Pages, 316; with maps and illustrations.

BOOKS REVIEWED.

Transactions of the American Electrochemical Society. Volume II. Second Meeting. Charles J. Reed, Secretary. Philadelphia; Published by the Society. Pages, 280; illustrated.

We recently referred to the activity of this society and to the number of papers presented at its first meeting. The second meeting showed an equal interest, and some important papers were presented, most of them being very fully discussed by the members present. Among the important papers was one by Joseph W. Richards on "The Efficiency of Electric Furnaces"; one paper by Mr. Hutton on "The Fusion of Quartz in the Electric Furnace"; one by Dr. Haber on "The Formation of Metallic Dust from Cathodes," and one by Alfred H. Cowles on "A Unit of Electric Quantity for Use in Electrochemical Calculations." Other papers of much interest were presented, but the list is too long for detailed reference to all.

Lead and Its Compounds. By Thomas Lambert. London; Scott, Greenwood & Co. New York; D. Van Nostrand Company. Pages, 228; illustrated by 40 plans and diagrams. Price, $3.50.

This book treats briefly of the history of lead, the geographical distribution of the lead industry, physical and chemical properties of the metal and its compounds, the dressing of lead ores, smelting of lead ores and condensation of lead fume, desilverization, manufacture of lead pipes and sheets, use of litharge and massicot, lead poisoning substitutes for white lead as pigment, zinc and its compounds, pumice stone, drying oils and siccatives, oil of turpentine, classification of mineral pigments according to their color, analysis of raw and finished products.

The impossibility of treating effectively within the limits of 228 pages the broad range of subjects which are touched upon in this treatise must be obvious. The book is a compilation of old matter, which has neither been well selected nor well digested. There are numerous inaccuracies which are of such character as to imply lack of information on the part of the author.

American Industrial Conditions and Competition. Report of the Commission Appointed by the British Iron Trade Association. Edited by J. Stephen Jeans, Secretary of the Association. London, England; published by the British Iron Trade Association. Pages 616; illustrated.

The British Iron Trade Association has always taken much interest in American practice, and this was naturally stimulated when, in the years preceding the present enormous expansion of the home trade, American manufacturers began to export iron and steel on a considerable scale. The Association then appointed a commission, including men well known as experts in the trade, to examine into conditions in the United States and to report on manufacturing conditions and the probabilities of extended competition. The members of the Commission visited this country, and were given—as the editor of this book gracefully acknowledges—every possible facility for examination and investigation. The results of their labors are given in the present volume, and are exceedingly interesting. They give the views of our methods taken by competent and shrewd, but not unfriendly, critics; and bring out many points which might not have occurred to our own observers, because they naturally looked at matters from a standpoint different from that of our own people.

A large part of the book is taken up by the "General Report on American Industrial Conditions," prepared by Mr. J. Stephen Jeans. This is divided into twelve sections, the first of which is a general introduction and outline of the investigation. Section 2 treats of raw materials—iron ores and fuel of all kinds. Section 3 is on labor conditions, and Section 4 on organization and administration. Transportation systems and conditions are described in Section 5; while Section 6 is devoted to the cost of producing iron and steel. In Section 1 the manufacture and treatment of finished steel products are treated. Section 8 relates to trusts and consolidations. The basic steel industry is the subject of Section 9. Collateral industries—such as rolling mills, locomotive and steam engine building, foundries, shipbuilding and electrical work—are referred to at length in Section 10. In Section 11 some economic problems are discussed, such as currency and credit, tariffs, foreign markets, laborers' and employers' associations, capacity of works and profits of manufacture. In Section 12 the Canadian iron and steel industries are described. An appendix is given, including many details of operations gathered from well-known works. This is a comprehensive and very valuable report, deserving and requiring careful reading and comparison.

Following this general report are three special ones. Mr. Axel Sahlin, a well-known expert, writes of the production of coke and anthracite pig-iron. In twelve chapters, the first introductory,

he treats in order of the geography of iron; the production of ores; transportation and handling of ores; blast furnace fuel and flux; location of furnaces; blast furnace plants; stocking and charging material; handling furnace products; blast furnace practice; description of some plants; direction, management and labor; and future markets.

The third report is by Mr. Enoch James, and is on the steel industries. Its four parts relate to the bessemer process; the open-hearth process; features of rolling mills and conditions of labor.

The concluding report, by Mr. Ebenezer Parkes, is on the bar and sheet manufactures. To this Mr. Parkes adds an interesting chapter on technical schools in the United States.

The book is a remarkable one, not only on account of the value of the reports and observations, but also because it shows a degree of international comity and friendship among manufacturers which was totally unknown not very long ago. Our iron and steel makers gave all possible information freely to the representatives of their chief competitors in trade. This was done freely and without any reservation of "trade secrets." They evidently recognized the strength of their own position, and the value to them of the acute and friendly criticism which they receive in these reports.

A Treatise on Roads and Pavements. By Prof. Ira Osborn Baker. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 664; illustrated, Price, $5.

Prof. Baker has written extensively at different times on the construction of roads and similar engineering work. This book, however, is not a collection of scattered writings, but a well considered treatise on the engineering, location and construction of country roads and city pavements. The author shows that the science of road-making and maintenance is really based on well-established elementary principles, and that success in the art depends upon correct reasoning from these principles rather than in attempting to follow certain rules or methods of construction. In cases where there exist a difference of opinion in regard to the best method, he has stated both fairly, with the reasons for the conflicting views. The first part of the book is devoted to country roads, and a large portion of this is given up to the principles involved in the construction and maintenance of earth and gravel roads. This is important, since such a large percentage of our country roads are and must continue to be of this class. While the use of broken stone and other similar material for making hard roads is extending very rapidly, it is limited by local conditions, and there are many parts of the country where the use of such roads is not practicable, either on account of their cost, or from the scarcity of material.

The second part of the book relates to urban and suburban roads, which include that class of roads having pavements or hard surfaces. This has been based generally on American experience and American conditions, not only because they are best suited to this country, but because in some respects they are superior to those of any other country. A good deal of space is given to maintenance, which is the point upon which most engineers and roadmasters having charge of city pavements and roads in suburban towns fail. We are all familiar with the many instances in which a good pavement has suffered from careless or incompetent maintenance to the great injury of the public.

The information contained in this book seems to us to have been carefully compiled, and it is generally presented in a clear and intelligent way. It will be valuable compendium for engineers having charge of the construction of roads or the supervision of their maintenance.

SCOTCH BLAST-FURNACES.—On March 15 there were 84 furnaces in blast in Scotland, or two more than at the same period last year. Of these furnaces, 48 are running on bessemer and basic pig.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

MINING COMPANY CAN ACT DURING STAY OF RECEIVERSHIP PROCEEDINGS.—Where a receiver was appointed for a mining company, but a stay was granted pending a hearing in the Supreme Court, the company had full power to bring an action for trespass of its mining claims, until the receiver took possession, and after his discharge it had the right to prosecute to completion an action so commenced during the stay of proceedings in the receivership.—Boston & Montana Consolidated Copper and Silver Mining Company v. Montana Ore Purchasing Company (71 *Pacific Reporter,* 47); Supreme Court of Montana.

RESUMPTION OF LABOR PREVENTS FORFEITURE.—The failure to perform the annual labor on a mining claim does not render it open to relocation made after the owners have resumed work. Annual work can be performed on one mining location for the benefit of several, when there is a community of interest in all the locations, which brings it within the provisions of the laws of the United States, as expressed in the Revised Statutes of the United States, section 2324.—Little Dorrit Coal Mining Company v. Arapahoe Coal Mining Company (71 *Pacific Reporter,* 389); Supreme Court of Colorado.

DELAY IN MOVING TO SET ASIDE DEFAULT JUDGMENTS ARE FATAL.—A mining lease provided that on default of the lessee to pay for twenty days after the same became due the royalties provided in the lease a judgment of ejectment might be entered. It was held that a judgment entered many months after default in the payment of royalties and in the payment of taxes and interest premiums provided for in the lease will not be set aside.—Beedele v. Hilldale Mining Company (53 *Atlantic Reporter,* 764); Supreme Court of Pennsylvania.

WHAT IS NOT VIOLATION OF RESTRAINING ORDER.—The fact that a mining prospector with his assistants has entered upon another's property, held under application for a patent as a mining claim, and is sinking three shafts, the debris being deposited by their operations, and has carried away an assay sample, will not warrant an injunction to restrain trespass; it not appearing that the prospector is insolvent, and his acts not tending to destroy or materially injure the substance of the estate. The entry on another's mining claim for the mere purpose of posting notices of a discovery of quartz lodes with the intention of locating them is not a violation of a restraining order issued to prevent the continuation of a trespass consisting of the sinking of shafts, etc.—Harley v. Montana Ore Purchasing Company (71 *Pacific Reporter,* 407); Supreme Court of Montana.

PERFORMANCE OF STATUTORY DUTIES DOES NOT RELEASE FROM LIABILITY.—The laws of Kansas (Chapter 159, 1897), which make it incumbent upon every mine owner, agent, lessee or operator of a coal mine to employ a competent fire-boss, whose duties as described by the statute are to "examine every working place every morning with a safety lamp before the miners or other employees enter their respective working places," do not prescribe the limit of care to be exercised by such mine owner or operator towards employees engaged in working the mines. The statute increases the duties of the owner or operator by requiring him to employ a competent person to look especially after the condition of the mine, and if, through the negligence of such fire-boss, one of the employees is injured by the explosion of gas therein the owner or operator is liable in damages for such injury, even though such person was competent and had made the examination required by law.—Schmolstieg v. Leavenworth Coal Comapny (70 *Pacific Reporter,* 888); Supreme Court of Kansas.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Society of Electrochemists and Metallurgists.

Sir.—On page 380 of THE ENGINEERING AND MINING JOURNAL for March 7, you mention the Society of Electrochemists and Metallurgists. It may prevent confusion and may interest you to know that at the first council meeting it was unanimously decided that the name of the Society should be "The Faraday Society, to Promote the Study of Electrochemistry and Electrometallurgy, Chemical Physics and Metallography and Kindred Subjects." The address of the Society is 82 Victoria Street, London, S. W., England. A. K. HUNTINGTON.

London, March 17, 1903.

Gold and Silver Products in Electrolytic Refineries.

Sir.—In looking over the statistical figures of silver and gold production given in my article on "Electrolytic Copper Refining," in your issue of March 14, I note that the following changes were made from the figures of my manuscript copy, which I inadvertently overlooked in correcting proofs.

The by-product of silver recovered daily should read 74,100 oz. instead of 741,100 as given, while the annual gold output of the American copper refineries according to their returns, supplemented by my estimates in a few cases, amounted to 346,020 oz., valued at $7,152,233, instead of 250,000 oz., valued at $5,167,500, as stated.

Please insert a note calling attention to these corrections in your next issue. TITUS ULKE.

Johnsonburg, Pa., March 28, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Manganese Ore.—What is a unit of manganese, and, as per the current wholesale price list published in the JOURNAL, how can I calculate the value per short ton of, say, 40, 45, 50, 55, 60 and 64 per cent manganese ore?—MANGANESE.

Answer.—The trade custom is to base all prices on an ore containing 50 per cent manganese. To find the value per short ton multiply the per cent of manganese content by the price quoted per unit; thus a 50 per cent ore at 18c. per unit would be worth $9 per ton. A lower or higher grade ore would bring a proportionate amount. Deductions are usually made for phosphorus in excess of 0.1 per cent, and for silica in excess of 8 per cent.

Magnesite.—I am anxious to obtain information as to the method of mining and preparation of magnesite for market; its consumption and uses in America, and value.—F. M.

Answer.—Magnesite is produced chiefly in Greece and Austria-Hungary, though extensive deposits exists in Germany and other foreign countries, and in the United States an increased quantity is being mined in California. Uses for magnesite are growing, but the larger part of the world's production is consumed in the manufacture of carbon dioxide gas for carbonating beverages; making bricks for open-hearth furnaces and converters in the steel industry and for lining rotary kilns used in the manufacture of portland cement; in the preparation of Epsom and Glauber salts, and as a

non-conducting covering for boilers, etc. Grecian crude magnesite sells, f. o. b. New York, at $6 to $6.50 per long ton; calcined, $17.50 to $18 per short ton, and bricks (foreign and domestic), $175 per thousand. Further information relative to this subject will be found in *The Mineral Industry*, Volumes II and X.

Molybdenum.—Can you give me any information as to the value of molybdenum and the addresses of buyers of the ore?—G. W. D.

Answer.—The price of molybdenum ranges from $1.55 to $2 per pound. During 1901 the latest statistics at hand, the production of molybdenum amounted to 35,000 pounds and ferro-molybdenum to 16,000 pounds. The following concerns purchase ores of the rare metals: A. B. Frenzel, 1540 Sherman Avenue, Denver, Colo.; Ash & Deninger, Phoenixville, Pa.; Primos Chemical Company, Philadelphia, Pa.

THE SHERMAN AUTOMATIC ORE BUCKET TRIPPING DEVICE.

The object of this automatic machine is to trip, or dump, ore or other similar buckets at any point desired between the cable above and the receiving bin, car, boat or other receptacle below.

Its operation is as follows: At the bottom of the automatic tripper is fastened a heavy hook, which is hooked to the bale of the ore bucket or other receptacle. The bucket, together with the automatic

THE SHERMAN AUTOMATIC BUCKET TRIPPING DEVICE.

tripper is elevated and conveyed along the cable to its destination or dumping place, when the bucket together with the tripper just above it is lowered. The tripper, an automatic device, will trip or empty the bucket at any point desired between the cable above and the receiving bin below. At first the automatic tripper is set so as to dump the bucket close to the ground, and as the pile increases in height, the tripper can be changed so as to dump the bucket higher up, and so on until the pile is as high as desired. It can be changed to dump at any point in a very short time by simply loosening a hand wheel and changing the position of the pawl.

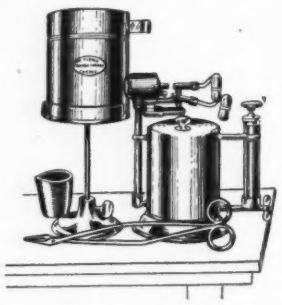
It requires no hand labor in emptying the bucket. Ordinarily it is necessary to have a man at the car to dump each bucket, but by using this automatic machine, his labor can be entirely done away with for the machine will automatically dump its load wherever desired. This is a very important matter indeed, especially in handling large quantities of coke, coal or other similar substances which are liable to be damaged by breakage.

It is also very important in handling ore, especially when emptying same into cars from boats. It is strong and substantial, and not liable to get out of order. The cut given shows the bucket just after being tripped or emptied by this automatic device.

It is manufactured by the C. O. Bartlett & Snow Company, of Cleveland, Ohio.

THE TURNER CRUCIBLE FURNACE.

The Turner Brass Works, Chicago, are manufacturers of the Turner crucible furnace outfit, illustrated herewith. This device occupies a space of 12 by 5 ins., and is handsomely nickel plated. The fireclay casing holds the heat so perfectly that the most refractory substance can be fused with ease. The crucible will hold about 10 ounces of gold.



TURNER CRUCIBLE FURNACE.

The power which can be obtained from the blowpipe is far beyond what is required for most purposes and is limited only by the fusibility of the crucible and casing. This blowpipe is detached from the furnace, and can be used for brazing, tempering, annealing, fusing, soldering and all other work where heat is required. It is remarkable as producing a very high degree of heat, owing to the use of the double jet construction in the burner. The air and gas enter the combustion chamber separately, and are independently controlled by the operator. They are there united in the exact chemical proportions and produce perfect combustion and shoot forth in one intensely hot pointed flame.

PATENTS RELATING TO MINING AND METALLURGY

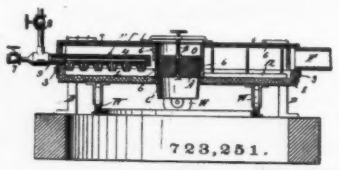
UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the Engineering and Mining Journal upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the Journal in which notice of the patent appeared.

Week Ending March 24, 1903.

723,243. ROTARY CONCRETE-FLUME MACHINE.—Charles R. Cook, Ethanac, Cal. The combination with the hopper, of means for moving same forwardly, a feeding device arranged within the hopper for projecting material through an opening produced in the rear of the hopper, and a series of rollers arranged at the rear of the hopper and adapted to pack the material fed therefrom.

723,251. METALLURGICAL AND CHEMICAL FURNACE.—Charles A. Doremus, New York, N. Y. A metallurgical and chemical furnace which consists of a hori-



zontally-rotating covered hearth, on which the materials to be treated are spread, and burners placed radially within the furnace and extending over the surface of the hearth in such position as to project the flames issuing from them upon the hearth.

723,263. COMPOSITION FOR AN ACID-PROOF CEMENT.—Hugo Gallinowsky, Philadelphia, Pa., assignor of one-half to William Maguire, Toronto, Canada. An acid-proof cement consisting of a fibrous material impregnated with magnesium chloride and silicic-acid anhydrate combined with a basic cement.

723,276. ANNEALING SYSTEM.—Johnson Hughes, Philadelphia, Pa. In an annealing system, the combination of a heating-chamber, with a muffle or cooling chamber, and means for conveying to said heating-chamber air heated in said muffle-chamber.

723,277. HOIST.—George C. Hunter, Chicago, Ill. The combination of a pair of connected cylinders; a pair of oppositely-acting pistons, each carrying a pulley at its outer end; a fluid-supply chamber; a valve communicating with both the inner and outer ends of said cylinders, and adapted to exhaust the fluid at the outer ends of said cylinders and at the same time admit fluid into their inner ends, and to exhaust the fluid from the inner ends of said cylinders and at the same time admit fluid into their outer ends; and a cable passing over said pulleys and adapted to be taken up through the outward movement of said pistons.

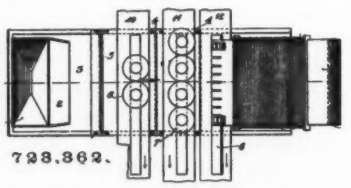
723,281. MAKING CEMENTITIOUS PRODUCTS OR ARTIFICIAL STONE.—William E. Jaques, Grand Rapids, Mich., assignor to Alfred O. Crozier, Grand Rapids, Mich. An improvement in making a cementitious product or artificial stone, consisting in forming a compact porous mass of moist and unset cementitious material; then covering an external surface of the said compacted mass with a cementitious liquid and confining the said liquid externally of the said surface; then exerting further pressure upon the aforesaid compacted mass to spread the latter and thereby force or run moisture from the said liquid facing into the pores of the aforesaid compacted mass, and then permitting the resulting product to set and harden.

723,307. TUNNEL CONSTRUCTION.—Jesse W. Reno, New York, N. Y. In a tunnel structure, the combination with a cylindrical shell, of an exterior reinforcing member rigidly attached thereto.

723,310. KILN, FURNACE, ETC.—Jacob Roberts, Catasauqua, Pa. A kiln having a series of air-conduits intermediate the top and bottom of the walls thereof, a series of similar conduits opening above the charged furnace-space, inclined flaring mouths to said conduits, opening upon the furnace-space, said mouths being so inclined as to project the current of air issuing therefrom in the same direction to produce a spiral motion of the air-currents inside the furnace.

723,311. MANUFACTURE OF EXPLOSIVES, CELLULOID, OR THE LIKE.—Robert Robertson and William Rintoul, Waltham Abbey, England. A process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulphite and subsequently separating the acetone.

723,362. PROCESS OF CONCENTRATING ORES.—Henry F. Campbell, Melrose, Mass. A process of concentrating ores to remove a definite proportion of constitu-



ents capable of being rendered paramagnetic, consisting in heating said ores to render said constituents paramagnetic and passing the same through a magnetic field of a strength inversely proportioned to the degree of exposure to heat.

723,363. PROCESS OF CONCENTRATING ORE.—Henry F. Campbell, Melrose, Mass. A process of concentrating ferruginous ores containing sulphides, which consists in heating the material for a brief time sufficiently to render portions thereof responsive to electrical influences without the removal of a substantial amount of any constituent other than water, and subjecting the material to such influences for the removal of the portions of the material rendered responsive.

723,368. PROCESS OF PURIFYING AND DESULPHURIZING CRUDE PETROLEUM AND PETROLEUM DISTILLATES.—Theodore F. Colin, Elizabeth, N. J., and Otto P. Amend, New York, N. Y. A process of desulphurizing petroleum and its distillates which consists in the oxidation of the sulphur contained therein (without precipitation of the sulphur) by means of a hypochlorite in alkaline solution in the presence of an oxygen-carrier or catalytic agent, at ordinary or slightly-elevated temperatures.

723,387. PUMPING-ENGINE.—Ebenezer Hill, South Norwalk, Conn. A pumping-engine having a main pump with inwardly-opening inlet and outwardly-opening discharge valves, closed chambers containing parts of said valves, a reciprocating auxiliary pump, a fluid connection between the main-pump-operating cylinder and the auxiliary-pump-operating cylinder, whereby the latter is operated by the same fluid as the former, and a single fluid-conduit connecting each closed main-pump valve-chamber with the auxiliary pump whereby fluid is through each single conduit forced to and drawn from each pump-valve chamber by the auxiliary pump for accelerating the opening and closing of the main-pump valve.

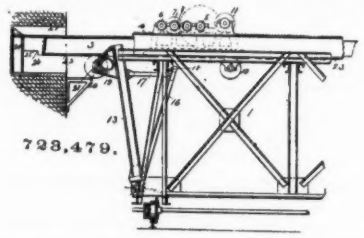
723,398. ART OF OPERATING ELECTROLYTIC CELLS.—Ernest A. Le Sueur, Sault Ste. Marie, Canada. An improved art of operating electrolytic cells having porous diaphragms separating bodies of liquid on the anode and cathode sides, respectively, which consists in feeding solution to be decomposed to the anode-compartment, maintaining a greater fluid-pressure on the anode side of the diaphragm than on the cathode side, whereby movement occurs of solution from the anode-compartment through the diaphragm to the cathode-compartment, and feeding water to the cathode-compartment in such a manner as to displace

an equivalent volume of the alkaline solution from said cathode-compartment.

723,437. APPARATUS FOR CHANGING WINDING-ROPES IN MINES.—Alexander Beien, Herne, Germany In an apparatus for changing ropes in mines, the combination of a winding-reel upon which the substitute rope is wound, a friction-geared steam-crane provided with two drums around which the substitute rope passes from the reel in single convolutions side by side, and a rope-wheel under which the substitute rope passes to be temporarily connected to the rope to be replaced.

723,443. MELTING-FURNACE.—Fred H. Daniels, Worcester, Mass. A melting-furnace comprising the main chamber, its floor downwardly curved forming a melting-basin, the annexed preheating-chamber provided with a floor composed of a series of adjacently-disposed water-pipes that overlay the bed of fire-brick, and upon which the cold materials are charged and moved forward, said pipes being so arranged as to permit the feeding of miscellaneous scrap, and a power-operated charging device adapted for moving the materials along the pipe-floor into said melting-basin.

723,479. COKE-PUSHER.—Edwin A. Moore, Philadelphia, Pa. A coke-pusher having an extensible jib pivotally secured at its lower end to the frame of a car, and provided



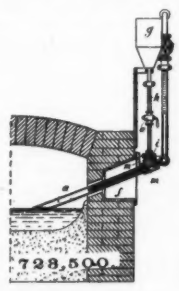
with revoluble carriers; in combination with a pusher-bar supported by said jib and carriers, and provided with means for projecting and retracting the jib.

723,485. DREDGER.—Raymond A. Perry, Oakland, Cal. A dredge-boat having in its hull a channel which is elongated in the direction of the length of the boat said channel extending through from the deck to the bottom and being open at both top and bottom, a spud or pile to be driven through said channel into the mud beneath the boat, and power devices connecting the boat with the fixed spud or pile whereby the boat may be advanced relative to the spud or pile.

723,493. DOUBLE COKE-PUSHER.—Frederic W. C. Schniewind, New York, N. Y., assignor to the United Coke and Gas Company, New York, N. Y. A coke-pusher provided with two opposite balancing pusher-bars, means for supporting said bars, and a separate motor for each bar, whereby the bars may be reciprocated simultaneously or independently of each other; in combination with two opposite ovens.

723,494. CEMENT AND ARTIFICIAL-STONE COMPOSITION.—Adolph C. Schultz, Detroit, Mich., assignor of two-thirds to George A. Ficke and Frederick Wilhelm, Cincinnati, Ohio. A composition of matter for use as a hydraulic cement or petrifier consisting of burnt or vitrified clay or brick and gravel in the pulverized state and lime.

723,500. TREATING COPPER ORES AND ORES OF COPPER AND NICKEL.—Hermann G. C. Thofehrn, Paris, France, and Bernard de Saint Seine, Widnes, England.



A treatment of copper ore, matte of copper and raw copper in a reverberatory furnace, consisting in blowing into said furnace on the surface of the bath, a mixture of superheated steam and air carrying along silica.

723,501. MANUFACTURE OF STEEL.—Hermann G. C. Thofehrn, Paris, France. A process for the manufacture of steel consisting in blowing in a hearth-furnace, on the surface of a cast-iron bath and by means of blast-pipes a mixture of air, steam, lime and hydrocarbons.

723,516. DUMP-CAR.—Frederic A. Delano, Chicago, Ill. In a car of the class described, the combination of a supporting-frame, a flat bottom portion extending longitudinally of the car out and to each side of the longitudinal center and provided with downwardly and outwardly inclined lateral edges forming discharging-aprons and side boards formed of vertical portions arranged at or near the outer side of the car and swinging doors pivotally secured to the vertical portions inclined downwardly and inwardly to meet the floor portion.

723,528. KILN OR APPARATUS FOR CALCINING PURPOSES.—John R. Horton, Worksop, England. In calcining kilns an inclined outlet passage, an outer door adapted to close said passage completely, an inner door arranged in said passage and adapted not to close said passage completely when in its position of closure, and means for causing said inner door to assume its said position.

723,531. APPARATUS FOR CONDENSING SMOKE, FUMES, OR GASES.—William B. Jackson, Denver, Colo., assignor to the Smoke Exterminator and Fume Condenser Company, Pueblo, Colo. In a smoke and fume condenser, the combination of a condensing-tank, a conduit for introducing smoke and fumes into the tank, a larger auxiliary conduit, mounted in the tank and surrounding the inlet, and a spraying device located within and carried by the auxiliary conduit.

723,561. ARTIFICIAL FUEL.—Helen M. Van Etten, Moravia, N. Y. A composition for artificial fuel consisting of mineral coal mixed with bitumen and alum.

723,594. PROCESS OR PRODUCING STEEL.—Peter Eyermann, Benrath, near Dusseldorf, Germany. A process which consists in charging liquid pig-iron from the blast-furnace directly upon a furnace-hearth, and heating the metal first by the combustion of poor blast-furnace gas, and finally by the combustion of improved blast-furnace gas.

723,595. APPARATUS FOR MAKING SULPHURIC ANHYDRIDE.—Williamm C. Ferguson, Flushing, N. Y., assignor to General Chemical Company, New York, N. Y. An apparatus for the manufacture of sulphuric anhydride, said apparatus comprising a plurality of contact-chambers, a connection-pipe from the outlet of one chamber to the inlet of the next, an air-supply pipe branched on such connection-pipe, and a regulating device on said air-supply pipe.

723,596. PROCESS OF MAKING SULPHURIC ANHYDRIDE.—William C. Ferguson, Flushing, N. Y. assignor to General Chemical Company, New York., N. Y. A process which consists in bringing a mixture containing sulphurous-acid gas and air into contact with catalytic substances in such proportions as to convert only a portion of the sulphurous-acid gas into sulphuric anhydride, then carrying the partially-converted mixture away from the catalytic substances, and mixing cool air with the said partially-converted product, and thereupon bringing the mixture of such air and the partially-converted product into renewed contact with catalytic substances to continue the conversion into sulphuric anhydride.

723,601. MANUFACTURE OF CAST-IRON ALLOYS.—Georg Grunauer, Berlin, Germany. A process of producing an alloy of cast-iron and nickel, which consists in melting cast-iron in a suitable furnace, tapping off the metal, and adding nickel to the molten metal after it has left the melting-furnace.

723,620. BRICK-KILN.—John Peck, Haverstraw, N. Y. A brick-kiln having a grate at each end of the arch and having in the middle portion of the arch an open or checker work of brick to which the grate-bars extend.

723,631. METHOD OF HEATING MATERIAL.—Edward G. Acheson, Stamford township, Canada, assignor to the Acheson Company, Niagara Falls, N. Y. A method of conducting reactions which proceed under definite temperature conditions, which consists in maintaining within a mass of material regions of definite maximum and of minimum temperature, both of which are comprised within the temperature limits of the reaction, whereby the operation is conducted throughout the entire mass of the material under treatment.

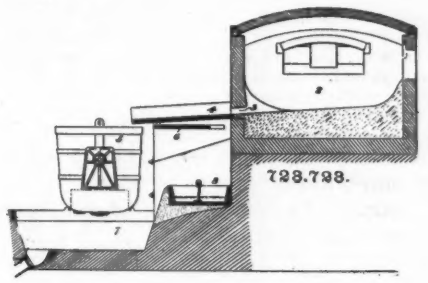
723,643. ELECTRIC FURNACE.—Charles S. Bradley, New York, N. Y. An electric furnace consisting of a rotary wheel or annulus forming the receptacle for the material under treatment, said annulus having sides and bottom each formed of sectional plates, each of said plates consisting of a metal backing provided with a suitable lining secured thereon, and means for passing the current through the material within the furnace.

723,668. RECUPERATIVE GAS-FURNACE.—Lazenby C. Hamlink, St. Louis, Mo., assignor to Laclede Fire Brick Manufacturing Company, St. Louis, Mo. A tiling-block for gas-furnaces having a channel extending therethrough and provided with an exterior groove extending transversely of the channel in the block and across two meeting sides of the block.

723,676. PUMPING APPARATUS.—David W. Jones, San Francisco, Cal. A pumping apparatus comprising a main or discharge pipe: a suction-pipe connected with the lower end of the main pipe: an injection-nozzle applied at the base of the main or discharge pipe: a check-valve in the main pipe: a pipe parallel with the main pipe and connected at its upper end with a pump at the surface: a feed-pipe connecting the upper end of the main or discharge pipe with a tank and a pipe connecting the tank with the side of the pump opposite its force-pipe.

723,688. APPARATUS FOR MEASURING AND CONVEYING COAL OR THE LIKE.—Bradford Leslie, Harrow-on-the-Hill, England. A conveyor comprising a girder hinged at its rear end, an endless chain hanging over the front end of the girder, cross-pins on the chain, self-righting buckets suspended from the cross-pins, running wheels carried by the cross-pins, rails on the girder whereon the said wheels run, a framing hanging in the bight of the suspended portion of the chain, sprocket-wheels in the said framing, and sprocket-wheels at the rear end of the girder with which the said running wheels engage.

723,723. APPARATUS FOR HANDLING PIT-SCRAP.—Frank E. Parks, Duquesne, Pa. The combination with an



open-hearth furnace, of an open-top mold resting in the pit beneath the metal-spout and in position to receive the metal drippings, said mold being separate from the spout.

723,743 and 723,744. PUMP FOR RAISING LIQUIDS BY COMPRESSED AIR.—Carl F. Simon, Stollberg, Germany, assignor to Chemische Fabrik Rhenania, Aachen, Germany. In a pump for raising liquids by compressed air, a distributing-valve, means for directing a pressure of air entrapped and compressed by the liquid as it flows into the container against said valve to move it in one direction, and means adapted during the raising of the liquid from the container to direct a pressure of air from a compressed-air supply against the valve to move it in the opposite direction.

723,751. APPARATUS FOR INDICATING THE THERMAL QUALITY OF GASES.—Wilbur F. Steele, New York, N. Y., assignor to Acme Gas Company, New York, N. Y. An apparatus for determining the thermal quality of gases, comprising a case having therein two tubes hinged together slightly out of alinement with each other, and attached to fixed points at their ends, the base of the lower tube having means for heating same, and the top of the upper tube being open to provide draft, a rack-bar attached to the central hinged point of the tubes, and multiplying-gearing and a pointer actuated thereby.

723,771. BUCKET-DUMPING APPARATUS.—Tury E. Anderson, Denver, Colo. The combination with a suitable frame, of a bucket-holder, a counterbalance normally holding the holder in the elevated position and in the path of the bucket to be dumped, and means connected with the bucket-holder for supporting the latter in operative position on the frame and adapted to invert the holder and bucket as they are carried downwardly by the gravity of the load which overcomes the counterbalance.

723,782. DRILLING-JAR.—Frank H. Norris, Tiona, Pa., assignor of one-half to W. C. Norris, Tiona, Pa. In a drilling-jar, the combination with the reins of a butt welded thereto and extending with the full size of the butt to approximately the end of the weld.

723,787. PROCESS OF EXTRACTING METALS FROM ORES.—Sidney Trivick, Chapham, England. A process for evolving nascent chlorine and effecting the chlorination of metallic substances in order that they may be extracted from a metalliferous mass by rendering them solvent consisting in adding to the mass a mixture in definite proportions of two substances, one being dry chloride of lime and the other a metallic salt, the proportions being such as to result in the formation of a hypochlorite of the metal of the added salt and a chloride of that metal which will evolve nascent chlorine.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending March 7, 1903.

26,673 of 1901. DYNAMO.—F. E. Elmore, London. A unipolar dynamo for rapid electrodeposition of metals, having its armature in direct electrical connection with the electrodes of the cell.

5,860 of 1902. STEEL MAKING.—W. Galbraith, Sheffield. A process for making steel, by first desiliconising and decarburising in an acid lined vessel, then dephosphorising in a basic lined vessel and afterward deoxidising in a Siemens furnace on which is also added the necessary carbon manganese, etc.

15,271 of 1902. ELECTRIC FURNACE.—C. A. Keller, Paris, France. In electric melting and refining having a preliminary chamber for mining into which the current may also be introduced.

17,314 of 1902. WASHING OUT DRILL HOLES.—J. V. Brejcha, Strassburg, Germany. Improved arrangement for washing out the holes made by rock drills.

27,988 of 1902. ORE BREAKER.—Fred Krupp Grusonwerk, Magdeburg, Germany. An ore breaker of the jaw type, having a reversible jaw with both sides made to be used as a crushing surface.

58 of 1903. NICKEL ORE SMELTING.—J. W. Chenhall, Totnes. Smelting nickel ores in the bath of molten iron or steel with which it is to be alloyed.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of The Engineering and Mining Journal. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the Journal and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. Courtenay de Kalb is now at Boston, Mass.

Mr. J. Parke Channing is in the City of Mexico.

Dr. E. H. Cook, of Denver, has been in New York City.

Mr. T. E. Schwarz, of Denver, Colo., has returned from southern Mexico.

Mr. Frank Klepetko is returning to New York City from his trip to Peru.

Mr. John B. Farish left New York City for Los Angeles, Cal., on March 28.

Mr. A. C. Beatty, of Denver, Colo., is now at the Dolores Mine, Chihuahua, Mex.

Mr. T. A. Bennett has returned to New York City from Cerro de Pasco, Peru.

Mr. James W. Neill, of Salt Lake City, was in New York during the past week.

Mr. J. Trowbridge Bailey, of New York City, has returned from a trip to Mexico.

Mr. C. L. Wright, of Omaha, Neb., is on his way home from the United States of Colombia.

Mr. M. A. Knapp is assistant manager at the Barranca del Cobre Mine, near Chihuahua, Mex.

Mr. Hennen Jennings has been elected president of the Institution of Mining and Metallurgy, London.

Mr. R. J. Frecheville, of London, has become consulting engineer to the Hinman Concessions, Limited.

Mr. H. W. Hardinge, mining engineer, of Denver, Colo., is in New York City on professional business.

Mr. J. H. Henley is now superintendent of the Valley Leasing and Mining Company, at Leadville, Colo.

Mr. John Hays Hammond has gone to Denver, Colo., on his way to the Dolores Mine, Chihuahua, Mex.

Mr. Daniel Lynch, of the Silent Friend Mining Company, of Leadville, has been visiting Central City, Colo.

Mr. J. J. Reilley, of Southern California, has been looking after mining interests in Gilpin County, Colo.

Dr. Alfred Simon, of London, has gone to Pittsburg, Pa., to investigate coal mining methods in Pennsylvania.

Mr. Arthur S. Dwight has resigned the management of the Compania Metalurgica Mexicana at San Luis Potosi, Mex.

Mr. Robert M. Raymond, manager of the El Oro mines, Mexico, recently visited the Butters plant at Virginia City, Nev.

Mr. Frank D. Jeffrey has been elected vice-president and general manager of the Union Iron Works, San Francisco, Cal.

Mr. George Chartier has left Los Angeles, Cal., for Paris, France, to be absent for 60 days on important mining business.

Mr. T. G. Davey, consulting engineer to the Rhodesian copper companies, sails from London on April 11 for South Africa.

Mr. Theodore F. Van Wagenen, of Salisbury, Rhodesia, is now on a mine exploration trip through Transvaal, Natal and Cape Colony.

Dr. J. A. Holmes, chief of the mining department of the St. Louis Exposition, has started on an Eastern trip to consult some of the mining exhibitors.

Mr. George W. Maynard, of New York City, accompanied by Mr. Forbes Rickard, of Denver, Colo., has gone to investigate a group of mines in Idaho.

Mr. A. Henderson, manager of the Compania Minera de Penoles at Mapimi, Mex., has been visiting with Mr. C. M. Van Cleve in San Luis Potosi.

Mr. J. H. Woodward, president of the Woodward Iron Company, of Birmingham, Ala., will return to his home this week after a trip to California.

Prof. Ira N. Hollis, who holds the chair of engineering of Harvard University, has been elected president of the Boston Society of Civil Engineers.

Mr. Percy L. Fearn, consulting engineer to the White Knob Copper Company, Idaho, came to New York City during the week to attend a meeting of his company.

Dr. Joseph Hyde Pratt, State mineralogist of North Carolina, and Mr. W. D. Twitchell, of Las Vegas, N. M., have been visiting mines near Florence, Ariz.

Mr. H. B. Davis has resigned the management of the San Luis Valley Land and Mining Company, at Crestone, Colo. Mr. Percy George, of Philadelphia, replaces Mr. Davis.

Mr. Ernest A. Wiltsee is now the agent, in New York City, of the Venture Corporation, Limited, of London, and Mr. John C. Montgomery, represents that company at Denver, Colo.

Mr. A. E. Stilwell, of Kansas City, Mo., president of the Kansas City, Mexico & Orient Railroad, is in Mexico with a number of English capitalists, who are looking for investments.

Mr. Robert S. Town, of New York, president of the Compania Metalurgica Mexicana, is in Mexico, looking after his many mining, smelting and railroad interests, throughout the Republic.

Mr. W. H. Davis, superintendent of the Smuggler-Union cyanide plant at Pandora, Colo., recently resigned to accept a position with the Idaho Gold Mining Company at Weiser, Idaho.

Mr. E. M. Rogers, formerly in Colorado, and lately connected with the Guggenheim Exploration Company, has opened an office as consulting engineer at 71 Broadway, New York City.

Mr. R. W. Purdam, of Thunder Mountain, Idaho, has gone to Pittsburg. He is accompanied by Mr. E. H. Dewey, general manager of the Boise, Nampa & Owyhee and Idaho Northern railways.

Mr. A. C. Poor has been looking over mining possibilities in the northern mining section of Gilpin County, Colo., soon to be developed through the new Moffat railroad from Denver to Salt Lake.

Mr. F. L. Sizer, of Helena, Mont., has been retained as consulting mining engineer by the Kimberly-Montana Gold Mining Company, which has taken over the Bear Gulch mines, near Jardine, Mont.

Mr. H. F. Wells, secretary of the Henson Creek Lead Mines Company, together with some of the Eastern stockholders, recently inspected the property near Lake City, Colo., and decided to close down work temporarily.

Mr. J. H. Means, of Sydney, N. S., manager of blast furnaces there, is in the Birmingham, Ala., District visiting relatives. He reports that the negro labor carried from Alabama to Nova Scotia is giving satisfaction, everything considered.

Mr. Charles M. Van Cleve, who for some years has been superintendent of the smelter at San Luis Potosi, Mex., has resigned his position to become superintendent of the smelting plant of the Compania Minera de Penoles at Mapimi, State of Durango.

Mr. W. A. P. Davis, of Philadelphia, Pa., who is a large stockholder in the Gregory-Buell Consolidated Gold Mining and Milling Company, operating near Central City, Colo., recently visited the properties, and was highly pleased with the outlook.

Mr. L. H. Mitchel has returned to Los Angeles, Cal., from a trip into the San Bernardino Mountains. During his absence he sustained a severe injury, which necessitated a very critical operation at the California Hospital. He is now recovering nicely.

Mr. J. C. Maben, president of the Sloss-Sheffield Steel and Iron Company, will, it is understood, take a 3 or 4 months' trip abroad this summer. Mr. J. W. McQueen, the second vice-president of the company, will be in active charge during President Maben's absence.

Mr. W. B. Fisher, general manager of the American Zinc, Lead and Smelting Company, of Carthage, Mo., who recently resigned, is at Colorado Springs, Colo., where he will reside during the summer. Mr. Fisher has been manager of the American Company's properties for 4 years.

Mr. Harry A. Lee, State Commissioner of Mines for Colorado, and Mr. John Wellington Finch, State geologist of Colorado, have formed a partnership under the firm name of Lee & Finch, for the general practice of mining engineering and economic geology, with offices in the Equitable Building, Denver.

Mr. Alexander Veitch has succeeded Mr. Joseph Colquhoun as general manager of the Arizona Copper Company, Limited, at Clifton, Ariz. Mr. Colquhoun retires after 20 years of active management, having made a great financial and technical success of the company's plans. He will continue to act as consulting engineer.

Mr. C. M. Donohoe, formerly with the Blue Belle Copper Company and Henrietta Gold Mining Company, of Mayer, Ariz., and the Trinity Copper Company, of Kennett, Cal., is now mining engineer with the Boston Richardson Mining Company, of Goldsboro, Nova Scotia. He is also consulting engineer for the Newfoundland Development Company.

Mr. J. C. Kolsem, who was recently elected president of the Indiana Bituminous Operators' Association, was born in Prussia in 1849, and came to this country, with his parents, in 1853. He went to Terre Haute, Ind., in 1863, and has been identified with the manufacturing and mining interests of Terre Haute for 30 years. Mr. Kolsem is general manager of the Jackson Hill Coal and Coke Company, one of the largest operations in Indiana.

OBITUARY.

Sidney V. Rowland, superintendent of the Pittsburg Coal Mining Company, and a leading citizen of Kentucky, died March 30 in Danville, Ky. He was an uncle of David R. Francis, president of the St. Louis Exposition.

George B. Armstrong, of St. Louis, Mo., for some time past superintendent of the mechanical department of the Compania Minera de Penoles, Mapimi, Mex., died at the American Hospital in the City of Mexico, recently, of cancer of the stomach.

SOCIETIES AND TECHNICAL SCHOOLS.

Harvard University.—The university offers a summer course of 5 weeks in geological field-work in the Rocky Mountains, beginning about July 1. The field selected includes the higher groups of mountains in southwestern Colorado. The course will be in charge of Charles H. White, of the University.

American Electrochemical Society.—This society will hold its third general meeting in New York City, April 16 to 18, at the Chemists' Club, 108 West Fifty-fifth Street. A number of papers will be presented and discussed, and excursions will be made to various points of interest.

A paper by Mr. Nelson W. Rogers upon the Cooper Hewitt vapor converter will be presented, and the apparatus will be shown in action.

Visits have been arranged to the following points: Columbia University, Crocker-Wheeler Electric Company, Cooper Union, Sawyer-Man Electric Company, and the magnificent power houses in or near New York City.

The American Electrochemical Society, founded in April, 1902, has now about 500 members.

American Institute of Electrical Engineers.—This society has arranged to extend certain privileges to students of electrical engineering at certain universities and technical schools, by the establishment of local or branch meetings to be held under the direction of a professor of electrical engineering, or in connection with an electrical society or other organization conducted by students. It has been arranged that upon payment of a $3 annual fee eligible students may attend meetings of the Institute, receive copies of meeting, announcements and monthy transactions, and also purchase the semi-annual bound copies of the transactions. Students of correspondence school are eligible, or students studying privately. Applicants must be indorsed by a member or associate of the Institute, be recommended by the board of examiners, and approved by the board of directors.

Australasian Institute of Mining Engineers.—This body held its first meeting for 1903 at Auckland. The meeting was somewhat sparingly attended, but was otherwise very successful. On the morning of February 4 the visiting members were officially welcomed by Mayor Kidd, of Auckland, himself an old miner. At the evening session Mr. Henry A. Gordon, president of the Institute, delivered an interesting inaugural address dealing chiefly with mining and milling conditions in New Zealand. At this and other sessions a number of papers were read and discussed, including the following: "The Igneous Character of the Carboniferous Rocks of the Tokatea Gold-field, Cape Colville Peninsula," by Alex. MacKay, government geologist; "The Wyalong Goldfield," by E. Janitzky; "The Rise and Fall of Dry Crushing on the Hauraki Gold-field," by P. G. Morgan; "Treatment of Auriferous Ores," by H. A. Gordon; and "Gold Dredging in Otago," by F. T. Seelye.

Visits were made to the Calliope dock and workshops, to the railway workshops, to the electric tramways power house, to Fraser's foundry and other places of interest in and around Auckland. A tour to the gold-fields occupied several days, Thames and Waihi being the principal places visited. The Waihi portion of the trip proved of great interest to the Australian members, who were much struck with the Waihi Company's mine and its batteries. Sev-

eral of the members also paid a visit to Rotorua and other places in the thermal or hot spring district, called the "Wonderland of New Zealand," where perhaps they were able to study quartz lodes in course of formation.

INDUSTRIAL NOTES.

The Pelton Water Wheel Company is figuring on a contract for Colombia.

The Crane Company, of Chicago, Ill., has taken a large South African contract for pipe, fittings, etc.

The Sullivan Machinery Company, of Chicago, has taken a fair-sized African contract for mining machinery.

The George V. Cresson Company, of Philadelphia, has a fair-sized Mexican order on hand for transmission machinery.

The Sterling Company, of Chicago, Ill., has secured a boiler contract from Valentin, Elcoro & Co., Mexico City.

The Weber Gas and Gasoline Engine Company, of Kansas City, is shipping gas and gasoline engines to Sommer, Hermann & Co., Mexico City.

The Velardena Mining and Smelting Company, Mexico, has placed a contract with Wonham & Magor, New York City, for 15 freight cars.

Messrs. Dodge & Day, of Philadelphia, Pa., have been commissioned to report on motor equipment for the Firth-Sterling Sheet Company, of Pittsburg, Pa.

The Dobbie Foundry and Machine Company, Niagara Falls, N. Y., has recently secured a Mexican order for hoisting engines for shipment to Vera Cruz.

The Brown Hoisting Machinery Company, of Cleveland, O., has secured a contract for a large coal-handling plant, to be shipped to Wakamatsu, Japan.

The Morgan Construction Company, of Worcester, Mass., recently secured a French contract for a large continuous mill to be installed in the Monton Iron and Steel Works.

The United States Court of Appeals has recently affimed an injunction granted against a pneumatic tool company for infringing the Moffet patents controlled by the Chicago Tool Company.

The Buffalo Forge Company announces the removal of its Pittsburg, Pa., offices from the Fitzsimmons Building to the House Building, on April 1. H. D. Wilson remains in charge.

The Brown Hoisting Machinery Company, of Cleveland, O., has recently secured through its New York office a contract for an overhead trolley system from T. Alexander & Co., Barcelona, Spain.

Furnace No. 3, of the Dominion Iron and Steel Company, at Sydney, N. S., has blown in. The furnace is 85 ft. high, 12 ft. in diameter at the bosh, and has a capacity of 200 tons of pig iron daily. The company will build a plate mill and a rod mill this summer.

The National Steel Company will erect at New Castle, Pa., stack No. 5, which will be a duplicate of No. 4. The stack will be 106½ ft. high and 23 ft. at the bosh, and its estimated daily capacity will be 600 tons of pig iron. It will be blown in about the first of next year.

The A. F. Smith Company, of New Brighton, Pa., has disposed of its fire brick plant to the Brighton Fire Brick Company, with temporary office at New Brighton, Pa. For the present the A. F. Smith Company is entirely out of the fire brick business, but will make building, common red and paving brick.

The Stanley Electric Manufacturing Company, through its Montana office, has sold to the Bismarck Nugget Gulch Consolidated Mining Company a complete power equipment, consisting of inductor alternators, induction motors, hot wire voltmeters and ammeters, lightning arresters and attendant controlling and regulating apparatus.

The Brown Corliss Engine Company, of Corliss, Wis., has received an order from the Middlesex & Somerset Traction Company, of New Brunswick, N. J., for a 16 and 30 by 42-in. horizontal cross-compound engine, and an 18 and 34 by 36-in. vertical cross-compound engine; also an order from the American Locomotive Company, of Dunkirk, N. J., for a 26 and 42 by 42-in. tandem compound engine.

The Detroit Automatic Stoker Company, of Detroit, Mich., is building a new plant, which has been made necessary by the growth of its business. The new plant will occupy about one and three-quarter acres. The foundry will be 184 by 185 ft., and the finishing department 150 by 72 ft. The company expects to be in its new quarters about May 1.

The Cross oil filter, manufactured by the Burt Manufacturing Company, of Akron, O., will be used at the World's Fair, St. Louis, in the present power plant. The Cross filter was used by the Omaha, Charleston, Paris and Buffalo exhibitions. The American Tinplate Company has sent its 25th order for oil filters to the Burt Manufacturing Company, and now has 30 filters in use in its works.

The Stacy Manufacturing Company, of Cincinnati, O., has decided to locate its new plant at Elmwood Place, O., and will begin work at once on a machine and erecting shop 130 by 500 ft.; a foundry 90 by 200 ft.; pattern shop and fireproof pattern storage room. The buildings will be of brick and iron. The company manufactures gas, water and oil tanks, coal elevators, cars, coke crushers, and does general structural work.

The capital stock of the Uniontown Engineering and Construction Company, of Uniontown, Pa., has been increased from $25,000 to $150,000. The officers are H. L. Burham, New Castle, Pa., president; O. W. Emrich, of Cleveland, O., vice-president; George E. Sperling, Pittsburg, Pa., secretary and treasurer. The company will manufacture equipment for coal and coke plants, railroad rolling stock supplies, etc.

Van Voorhis & Sanford, of Monterey, Nuevo Leon, Mex., have received an order from Pedro Alvarado, of Parral, Chihuahua, for a complete electrical power plant, consisting of 2 Bass Corliss engines of 100 h.p. each, 2 Ames Iron Works boilers of suitable size, and 2 General Electric generators of 75 kw. each, as well as heaters, pumps, wiring, etc. This plant will furnish power for the electric hoists at the La Palmilla Mine, and will also furnish lights for the hacienda, etc.

The Pittsburg Filter Manufacturing Company, of Pittsburg, Pa., will be incorporated under Pennsylvania laws, with a capital of $150,000. Since the concern started business in Pittsburg 3 years ago it has installed a large number of water softening plants. Several months ago it completed the largest water softening plant ever installed by a manufacturing concern for the Tennessee Coal, Iron and Railroad Company at Ensley, Ala. The incorporators are: J. B. Greer, E. S. Buchan, O. W. Rafferty, F. W. Severance and S. Severance, Jr. The offices are in the Farmers' Bank Building, Pittsburg.

The total aggregate power of steam turbines in use or under construction or ordered in different parts of the world is estimated at over 500,000 h.p., the major portion being used or to be used for driving dynamos, alternators or other electrical machinery. The British Westinghouse Electric and Manufacturing Company, Limited, has a contract from the Metropolitan District Railway Company, of London, Eng., for 4 turbo-alternators, each designed for a normal capacity of 5,500 kw., but caapble of carrying an overload of 50 per cent, giving for each unit a maximum output of 8,250 kw. These turbines will be not only the largest steam-turbines ever made, but also the most powerful single cylinder engines of any type whatever in the world, yet they are only 29 ft. long by 14 ft. wide, by 12 ft. high, the overall length of turbine and alternator being 51 ft. 9in. The steam pressure will be 165 lbs. per sq. in., and the speed 1,000 revolutions per minute.

TRADE CATALOGUES.

Pratt & Whitney Company, Hartford, Conn., sends out a circular calling attention to an addition at its works to its small tool department, doubling the capacity. The company states that it is now making yearly contracts for furnishing small tools to many of the largest and most progressive machine works in the country.

The Westinghouse electric pneumatic train control system for electric railways is described in a circular sent out by the Westinghouse Electric and Manufacturing Company. The growing importance of the electric railway and the increasing probability that it is to occupy much of the field now given over to steam traction renders of great interest methods and systems making electric traction feasible on a large scale. The demand for heavy suburban traffic the company states cannot be economically met by single cars running separately, while at the same time a flexible system in which cars can be operated in trains or single units has many advantages over present methods with steam locomotives.

The fuel gas system of the American Gas Company is described in an elaborate illustrated pamphlet of 210 pages. The company makes the American oil gas machines for converting naphtha into fuel gas automatically, pressure blowers to produce a positive air blast, gas blast furnaces for all mechanical heating processes, heating machines or gas blast furnaces arranged with carrying or propelling devices for the metal under treatment, blow-pipes and special laboratory or factory burners for any kind of gas in common use and complete factory plants with or without gas generators, for all mechanical heating processes. Among the various appliances made by the company are a large variety of assay furnaces, furnces for melting Babbitt metal, type metal, etc., and furnaces for case-hardening, brazing and soldering.

Catalogue No. 30, sent out by the F. M. Davis Iron Works Company, of Denver, Colo., is a circular describing the Davis roasting furnace. This furnace is of the straight-line type, with no chains within the furnace, but having instead a rabble with long side bars on each end, carried and driven by wheels in pockets on either side of the furnace. The rabble consists of hollow side bars and hollow transverse shafts, the bars and shafts being filled with water to keep them cool and to prevent any sagging. Some of the advantages claimed for the furnace are the independence of the foundations carrying the driving-rig from the parts subject to contraction and expansion; a positive mechanical drive outside of the furnace with all wearing parts adjustable; the general simplicity of design, and small amount of repair. The capacity of the furnace on siliceous ores containing 2 to 4 per cent of sulphur to be reduced to 0.5 per cent, is given as 1 ton per 24 hours on a hearth area of 14 to 16 ft., for sulphides containing 25 to 30 per cent sulphur, to be reduced to 0.5 per cent, 1 ton in 24 hours, for each 55 to 60 sq. ft. of hearth.

SPECIAL CORRESPONDENCE

Denver. March 28.

(From Our Special Correspondent.)

The bill before the Legislature, providing for an amendment to the State Constitution to permit ore treatment charges being regulated by the State, has been killed as impractical.

The recent advances by the American Smelting and Refining Company for the lead contents in ores have encouraged the miners at Leadville, Aspen, Silverton, Lake City, Georgetown, Montezuma and other districts who are preparing to increase output. Results will begin to show within 90 days. It is said of the lower end of Clear Creek County alone that the recent advances in lead prices mean an increase of $2,000 per month on the amount of lead-carrying ore now shipped. It is reported at the Denver office of the American Smelting and Refining Company that the tonnage output of lead-silver ores from the Coeur d'Alene District, Idaho, already shows an increase of 20 per cent.

The zinc-lead smelter at Canon City of the United States Reduction and Refining Company has been damaged by fire to the extent of $100,000. Two large bag houses, the refinery, cooperage shop, packing department and warehouse were destroyed. The company had completed remodeling the plant but a few days before. The ruined structures are to be replaced by street buildings, making the plant fireproof as the rest of the buildings are of brick and steel. The origin of the fire is not known, the flames breaking out in several places in the bag room. The blast furnaces will continue to run for 3 or 4 weeks, after which time they will shut down, and the ore received under contract will be stored. The plant is receiving about 100 tons of ore daily, mostly from Leadville. A special process is used for making pigment, which is shipped to all parts of the United States and Canada.

Governor Peabody's advisory committee has held meetings in Colorado Springs and Colorado City, and yesterday heard considerable testimony at Colorado City, from the strikers, who sought to show that inadequate wages were paid, and that employees had been discharged from the Standard Mill of the United States Reduction and Refining Company solely because they had become members of the local Mill and Smelter Men's Union. However, the question is no longer one of wages or hours, but of recognition of the union by the United States Reduction and Refining Company. The union insists that discharged union men shall be reinstated. The manager of the mill offers "to take back all men who left the employment of the company on account of the recent strike, without discrimination, as soon as vacancies occur." The officers of the Western Federation of Miners demand that "men who have been discharged and those who have left the company's service on account of the recent strike shall be taken back, without discrimination, within 30 days." The manager replies that it is impossible to set a time, as he cannot tell when one of the workmen will resign or when a vacancy will occur, and that he will not discharge any man who has kept at work, so long as satisfactory.

A committee of business men and others from the Cripple Creek District offered to find employment in the Cripple Creek District for the striking mill men at Colorado City pending local matters resuming their normal condition, but were told by the union officials that the strikers will not leave their homes. Later, through the efforts of the business men's committee the manager of the Standard Mill was induced to agree to reinstate the majority of strikers within 60 days, the exceptions being men who have made themselves personally obnoxious to him and his associates. The president of the Western Federation of Miners agreed to a 60-day limit for reinstatement of strikers,

and also to condition as to exceptions, providing the maanger of the Standard Mill furnished in writing a list of men he objected to.

(BY TELEGRAPH.)

On the night of March 31 the strike of the mill men at the Standard Mill of the United States Reduction and Refining Company at Colorado City, was settled at a conference between Manager MacNeil and Mr. Moyer, president of the Western Federation of Miners. By the terms of the agreement strikers are to be reinstated as fast as vacancies occur, and the company will at any time meet employees or committees representing them to consider grievances. Workmen in the mill proper will have an 8-hour day, while employees in the sampling department will work 10 hours. Governor Peabody and his advisory board are to say on May 18 if the arrangements made have been carried out.

San Francisco. March 25.

(*From Our Special Correspondent.*)

The principal topic of interest in mining circles has been the movement of the mine owners and operators to form the California Mine Operators' Association. Preliminary meetings have been held, and a call for a convention issued. The organization is "for the benefit and protection of all branches of the mining industry in the State of California." Invitations were extended to all the mine owners, superintendents, managers, etc., in every county of the State. The committee on temporary organization consisted of C. M. Belshaw, president of the California Miners' Association; Fred W. Bradley, E. C. Voorheis, David McClure, C. R. Downs, E. C. Hutchinson and Charles C. Derby, all prominent in the mining industry in this State. The chief object of the new organization is to protect the companies against the Western Federation of Miners which is now trying to gain a foothold in California. At the two places where the Federation has made the attempt trouble has resulted—namely, at the Mountain Copper Company's property, Shasta County, and at the mine of the Lassen Mining Company, Lassen County.

The movement is the outcome of one started in the Mother Lode counties, particularly Amador County, nearly a year ago. The superintendents there had an understanding among themselves as to miners' wages and miners, refusing to employ drunken or inefficient men and shutting out such as were not considered capable and honest. After the Mother Lode men met in San Francisco it was decided to widen the scope of the proposed organization and take in every county in the State, with the idea, if desirable, to include Oregon, Washington and Nevada mine operators later. Non-union miners are to be guaranteed support and unions will not be recognized in the matter of hiring or discharging men. If men desire to join a miner's union there will be no objection, but neither will the association object to men not belonging. In other words, a man will not be discharged at the request of any union. The mine owners will bind themselves on this question.

It is recognized that California is, generally speaking, a State of low grade ore bodies requiring large plants and large capital. The miners are satisfied with their present rate of wages, and are contented with their positions. But if the Western Federation seeks to control mining labor in the State, raising wages and hampering operations, it is recognized that numbers of mines will have to close down. The members are to oppose any dictation from federations or unions, but have no intention or desire to reduce wages or discharge union miners. Before the professional organizers came into the field the miners were contented, but where these gentry have appeared discontent and strikes have followed.

Judging from the preliminary meetings and the character of the men connected with the movement, it is likely that most of the mine owners and managers will become members. Thus the unions will not have individual companies to contend with, but an association of all the principal mining companies in the State.

At the Mountain Copper Company works at Keswick several of the strikers have been arrested for rioting. The strike at the Golden Eagle Mine, of the Lassen Mining Company at Hayden Hill, has ended. The Western Federation did not have much success at compelling the company to employ union men only, as the citizens of the region, recognizing the benefit the company was to the community, notified the leaders of the strike that no improper measures could be taken, and if any disorder occurred there would be trouble. Matters quieted down and the miners went to work again.

Oil is slowly being pumped through the long pipe line of the Standard Oil Company from Kern County to San Francisco Bay. The oil is quite heavy, and has to be heated and reheated to pass through the pipe satisfactorily.

There are 32 oil refineries in California against less than 6 a year ago. The total still capacity is now 31,000 bbls. The refineries are turning out, in addition to the oil products, about 3,000 tons of asphalt monthly. The new refinery of the Standard Oil Company at Point Richmond, San Francisco Bay, will soon be in operation.

A gusher in the oil fields near the Los Alamos divide, Santa Barbara County, seems to prove the theory that the region named will become a large oil producer in time. The Union and Carreaga companies have already made good discoveries there, or rather nearby. The new field is about 10 miles by 30 miles, and is not far from the ocean.

Los Angeles, March 25.

(*From Our Special Correspondent.*)

O. P. Posey, general manager of the Gold Roads Mining Company, at Kingman, Ariz., accompanied by Mr. L. A. Scowden, is visiting the mines. Nearly all the machinery for the new mill is on the ground. The development on the Bryan Claim is reported very satisfactory. The main shaft on the Gold Roads is filled with water below the second level. The new hoist is in place, and a large pump is installed. The tanks at the mill will be filled with mine water before the mill starts, May 1. The flow of water from Denver Springs will be pumped 1½ miles to a large reservoir, now built, thence led by gravity to the mill. This flow, augmented by the mine water, is reported amply abundant for camp, mine and mill purposes. A large force of men is busy. The ore blocked out is said to average $15 per ton, and to yield a high percentage of values by cyanide.

John B. Farish and Charles Moulson, consulting engineer of the London Exploration Company, have secured an option on the Chase group of mines, near Ludlow, Cal., for a reported price of $400,000. They will undoubtedly secure the Bagdad group adjoining the Chase on or before April 6. Dr. Hendrix, of Los Angeles, holds an option to that date. The price asked for the property said to be $1,400,000, will probably be reduced enough to warrant Messrs. Molson and Farish paying the reported owners' price of $1,000,000, with a fair commission to Dr. Hendrix. The properties promise to become large producers of milling ore.

Messrs. H. A. Howard, of Los Angeles, and John Spargo, formerly superintendent of De La Mar's Gold Mountain mines, near Victor, are making a preliminary examination of that property for Eastern men. There is an immense ore-body, said to average $3 per ton. The parties investigating the property have planned to build a 100-stamp mill, with electric power, and other improvements, if the values found justify the purchase.

The new furnace for the reduction of cinabar ores produced at the Oceanic Mines, near Cambria, is almost completed. The mines are reported well developed, with large ore bodies blocked out. Values are said to range from $6 to $13 per ton. F. W. Braun, of Los Angeles, is president of the company.

San Luis Potosi, Mex. March 24.

(*From Our Special Correspondent.*)

At the Tiro General Mine, in Los Charcos, State of San Luis Potosi, on the Mexican National Railroad, the work under the management of G. Stadelmann, mining engineer, of resetting the machinery and retimbering the old shaft is about completed. Pumping will begin early in April, and active mining by May 1. Meantime, the company is shipping to the smelters the old dump, which it is estimated will net sufficient to return the $400,000 paid for the mine. This property is controlled by Americans living in and around San Luis Potosi and Aguas Calientes. The Guggenheim Exploration Company held it under option for 30 days last fall at $800,000, but let it go, believing that present owners would not be able to take up the original option of $400,000.

The increase of the capital stock of the Guggenheim Exploration Company from $6,500,000 gold to $20,000,000, as recently reported, will enable it to take up, develop and operate many of the good propositions which it has under option. The latest option is on the Caballo Mine, Inde District, Durango, from W. S. Benton, and among its latest purchases are: The Veta Grande, of Zacatecas, bought a short time ago at $200,000, but now in bonanza, and paying the purchase price almost monthly; the Quebradilla Mine, of Zacatecas, from which it is shipping about 4,000 tons a month; La Reforma mines, from which it is sending 300 tons a day to No. 3 Smelter in Monterey, and the Bonanza Mines in Coahuila, where there is an old slag dump, which it is preparing to ship. The last purchase has caused the Mazapil Copper Company and other concerns to organize for building a railroad from Avalos station on the Coahuila & Zacatecas Railroad to San Pedro de Ocampo, and has also caused the rumor of the American Smelting and Refining Company building a smelter in the district. The Exploration Company will not build one, for it is not going into the smelting business, but is turning what plants it purchases with mines, as in the case of the Valardena, over to the American Smelting and Refining Company, and giving entire attention to mining, thus acting as a feeder to the trust smelters, in which it is largely interested. At the Mazapil Copper Company, George Wiseman, master mechanic, and W. J. Browning, general manager, are making many economical improvements.

F. P. Flood, engineer of the Mitchell Mining and Smelting Company, has surveyed for a 65-mile road from La Dicha Mines, of Guerrero, to Acapulco, on the Pacific Coast; the Mexican Central engineers have finished the survey from Gutierrez, State of Zacatecas, to the City of Durango, and building will not be long delayed; the engineers of the Mexican National have finished the preliminary survey from Rincon, State of Guanajuato, to the City of Guanajuato, and are busy on a line from Salvatierra, State of Guanajuato to Guadalajara.

The branch of the Mexican Central Railroad between Durango and Gutierrez will pass through the districts of Vacas, Chalchihuites and Sombrerete, from which last point the Sombrerete Mining and Milling Company is shipping 100 tons a day to the Torreon Smelter, hauling on carts to Gutierrez on the Mexican Central.

In mining stocks dealing is somewhat more active, and the following stocks sold at the accompanying figures: Torreon Metallurgical Company at $248; Monterey Iron and Steel at $130; Dos Estrellas, $1,850; Cinco Senores, $240; Hacienda de la Luz, Pachuca, $300; Santa Maria de la Paz, $790; San Rafael y Anexas, $910, and La Blanca at $900.

Medellen, Colombia. Feb. 18.

(*From Our Special Correspondent.*)

An important mining district is near Sonson. One of the most promising and best developed properties is the San Andres Mine, at an altitude of over 5,000 ft. above sea level. Two streams each having a very heavy fall cross the property, and can furnish power for every purpose. Over 26,000 tons of ore are reported in sight of an assay value of $42.63 per ton, and 5,000 tons of tailings assay $28, the company only saving about $7 per ton on the blankets. A shaft has been sunk on the ledge 1,000 ft. beyond the breast of the lowest level. The ore is nearly solid iron pyrites, with a little galena and zinc, and averages about 5 ft. wide. The property is about 15 miles from Sonson, and 45 miles from a port on the Magdalena River.

The country is beginning to recover from the effects of a three years' revolution, now settled. There is considerable complaint of a lack of labor, but conditions will improve, as the army is disbanded. Railroads are much needed, and are bound to come.

London. March 21.

(*From Our Special Correspondent.*)

There is rather more activity in South Africans, but the chief center of interest is the new Egyptian boom. A considerable fillip has been given by the publication of the fact that Mr. J. B. Robinson, the Rand magnate, has decided to take an active interest in the market, and has offered to put £50,000 into the Nile Valley Company. The consent of the Egyptian Government will have to be obtained, as the scheme involves a reconstruction of the company. At present the capital is £30,000, but the new company is to have a nominal capital of £250,000, of which about £200,000 in £1 shares will go to present shareholders, and £33,000 in £1 shares will be subscribed for at 30s. a share by Mr. J. B. Robinson. This is a big bargain for the company, and, judging from Mr. Robinson's reputation for shrewdness, there must be something excellent in the way of mining prospects. Another move of importance in this market is the decision of the Mysore Reef and General Exploration Company, one of John Taylor & Sons' companies, to acquire the Um Rus Mine from the Egyptian Mines Exploration Company. This latter company was one of the earliest to start exploring work, and has been under the management of Mr. C. J. Alford. The influx of these influential people will no doubt stimulate activity in Egyptian miinng matters, and before long every promoter will feel it his duty to obtain a concession of some sort or other.

Interest in the West Australian mining market has been revived by the publication of the report for 1902 of the Great Boulder Perseverance Company. During the year the production of gold was valued at £693,215, and the profit was £412,683. After appropriating £60,000 to equipment and development, dividends amounting to £350,000 have been paid for the year. The nominal capital of the company is £175,000, but a very large amount of money has also been spent out of revenue for the provision of plant. With dividends at the rate of 200 per cent, and with a prospect of their continuing, the shares are naturally at a high premium. To facilitate market dealings it is now proposed to reconstruct with a nominal capital of £1,500,000 in shares of £1 each, and to present eight fully paid shares in the new company for each one in the old. This will leave 100,000 new shares in reserve, for issue whenever considered desirable. The oxidized ores are now exhausted, but developments show the existence of great quantities of sulphides. It is estimated that there are 383,000 tons of ore available for treatment, averaging nearly 1.5 oz., so that the future of the mine is

very promising. Mr. Frank Gardner, the controller, and Mr. Ralph Nichols, the manager, deserve congratulations on the excellent condition of things.

During the last few weeks efforts have been made in some quarters to raise excitement over the Arltunga gold-fields in South Australia, and cables have been published, giving accounts of wonderfully rich discoveries there. This field is not a new one for alluvial gold was first found there 15 years ago, and in 1897 the quartz lodes were opened up. There is already a government stamp mill in operation, and a cyanide plant has also been erected. The district is 400 miles by road from Oodnadatta, which is 688 miles by rail from Adelaide. Conflicting reports are given of the natural and climatic features of the country. It is said by some to be a desert like Kalgoorlie, but I am informed personally by reliable men, who have first hand information, that it is a fairly well watered district, and is occupied by cattle stations. Like the rest of Australia it has suffered severely from drought during the last year or two, but to describe it as a desert is a mistake. There is no doubt that it is a promising gold-field, but whether it will be held locally or exploited in London remains to be seen.

One of the most candid and complete prospectuses of a mining company that have ever been issued, has been brought before the notice of the public this week. I refer to the Newcastle Natal Steam Coal Collieries. Limited, which has been formed to acquire the coal mining lease known as Ballengeich, situated on the railway near Newcastle, Natal. It is as long ago as 1892, when trial borings were made by Mr. (now Professor) R. A. S. Redmayne. The coal-seams are extensive, and average a total thickness of 10 ft. At one of the most representative bore holes the chief seams are 4 ft. and 2 ft. in thickness, and there are others a foot in thickness. There are bands of shale 3 and 6 ins. in thickness separating the various coal seams, so that dressing will have to be largely adopted. The coal itself is of good quality for steam raising purposes, and is very similar to South Wales steam coals. The carbon contents is 75 per cent, and the ash 10 per cent, so the volatile contents are low. The seams outcrop on the river bed, and at no point are they very deep below ground, 130 ft. being the average depths of the trial shafts. Mr. Redmayne and other colliery specialists estimate that there are over 20,000,000 tons of workable coal on the estate. The cost of production is gone into in detail, and $4.20 is given as the total cost, including transport to Durban, while the selling price is expected to average $5.40. This is a very moderate estimate for the selling price, as $7.20 is often obtained. The company counts chiefly on the steamship traffic, and exports to other countries for its business. Other colliery companies in the same district—for instance, the Natal Navigation and the Dundee—have thriven and paid excellent dividends. The capital of the present company is £120,000, of which £74,000 is purchase price. This is a very reasonable capitalization, and there can be no doubt that the shares will all be taken up. It is not often that the public have so good an opportunity of making a little money by speculative investment.

Johannesburg, Transvaal. Feb. 25.

(From Our Special Correspondent.)

One of the signs of the times was the formation of the Transvaal Miners' Union some months ago. It did not come into being during the Boer regime. In fact, labor difficulties were almost unknown in the days before the war. The union is not yet a strong organization, but will undoubtedly grow, and send its mandates to the employers. Already the union has had a strike at one of the leading gold mines here, but was unable to carry its point. The question was not one of pay.

If the scheme for the employment of cheap white labor is pushed, the inevitable result will be that the wage of the skilled man must fall, until the average pay of $3 per day for white labor rules along the Rand. No labor organizations, miners' unions, etc., can ward off this drop. Take for instance, rock-drill miners. On some mines the miner, generally against his wish, was given 4 white helpers, paid $1.25 per day, with board and lodging, instead of 4 Kaffirs at 50c. per day. The miner is in charge of 2 rock drills, for which he receives $6.25 per shift. In 4 months or so the helpers consider themselves competent rock-drill men, and obtain blasting certificates. They walk to a neighboring mine, show their certificates, and offer to run 2 machines for $4.25 per shift, instead of $6.25. To the high-paid miner this seems a small wage, but to these men who have been working for $1.25 per day, it is excellent pay. If this grading down of the skilled laborer's wages comes about to any great extent there is no doubt that many of the best men will leave. About the only inducement Johannesburg offers to the skilled artisan is a higher rate of pay than any other industrial center, and as soon as that inducement is gone the skilled artisan will leave for pastures new.

The pay for skilled artisans in the Rand gold mines is probably the highest average pay in the industrial world. In the engineer's report it is stated that in 1898 the average annual receipts of over 10,000 men employed in the gold industry, amounted to $1,765 per man.

It would be most unfortunate for the wage to fall here now, for the cost of living is so high, as high if not higher than it was during the Boer regime, that it is impossible for a married man to live decently on much less than $5 per day. The high cost of living will reach the low level existing in other countries very gradually, and it would be unjust to reduce the skilled man's wage until that day comes.

The big boom that was confidently predicted would follow British supremacy has not come, and there are sour-faced people here who say it will not arrive for many years. No doubt efforts have been made to start a boom, especially in certain stocks, but so far prices are nearly as low as they were after the big boom before the war. The market is not "dead," but the shares that are booming are not the kind that a man would buy, expecting to get 8 per cent or 10 per cent dividends. Just now the public here seems very keen over new syndicates, prospecting schemes, diamond schemes, etc. For a new syndicate to be a success the public requires it to be a continuation of the Main Reef series. A syndicate on some strange reef, carrying more gold to the ton, does not get as cordial a reception. Therefore, syndicate promoters get some so-called geological expert to make a report, conclusively proving the correlation of the syndicate's reef with that of the Main Reef. How much the ore of such a syndicate is worth per ton seems a mere after-thought, and of little importance compared to a satisfactory geological correlation.

It is strange that there should be such activity in these ventures, while the more solid stocks are neglected. But the Johannesburg market is speculative, and will be, I believe, as long as these gold-fields last. The reason is obvious to any one acquainted with the life and the conditions at the mines. A young fellow who has saved up $300 or $400 cannot deal in the best grade shares. He argues that $300 is of little use to him, and as stocks are bought in blocks of 100, he decides to risk his money on some wild scheme. On the same mine there may be other young men similarly situated, and they put all their money together to buy some shares in a highly speculative venture, making a "plunge." If you inform them that their venture is worthless, they reply that they know all about it, but it is whispered that the shares will have a big "run" in a few days, and they intend selling out before the "slump" comes. When it is remembered how many there are along the Rand with small sums which they are willing to lose in the attempt to double, it is seen what a demand there is for highly speculative shares.

Those who desire legitimate investments investigate every stock they buy, and if at the market price the stock will not give them a fair return on the money invested, the stock is not bought. For such the present state of the mining industry is unsatisfactory, for there is scarcely a stock which, at present prices and with the present industrial condition, will yield a satisfactory return. A man with money to invest may do one of three things: He may buy stocks in some promising mine, which undoubtedly will be a success in the future, be content with a small return, and wait for a better day; he may turn from mining ventures altogether, and go in for real estate, etc.; or he may send his money to some other place, where it can be placed to better advantage.

Sydney, N. S. W. March 5.

(From Our Special Correspondent.)

New South Wales.—In the past the managers of the Dapto and Cockle Creek works have returned as gold produced in the State that reduced at their works from imported ores. In the future a distinction will be made. For January the gold yield of this State was 30,361 oz. fine, valued at £127,965, from which must be deducted £54,983 from imported ores, leaving a net gold yield of 17,181 oz., valued at £72,982. At Wyalong, which started some years ago as a poor man's field, the yield of gold last year from all sources, including concentrates and tailings, was 18,430 tons for a yield of 20,718 oz., valued at £77,046. New alluivial diggings have been discovered at Comobella, 12 miles from Wellington, on private land adjoining Mitchell's Creek. Several nuggets up to 3 dwt. have been found. The finest specimen of first-class precious opal ever discovered at White Cliffs was found lately by Thomas Waters. The specimen, including rock, weighs 13 lbs., and contains a solid mass of brilliant opal, estimated to weigh 22 oz., and measuring nearly a foot square. When cut away from the rock it will be the largest piece of first-class opal in the world. The stone was purchased by Paul Volkert, who intends to take it to Vienna to get it cut and polished. The Conrad Mine has started work with a large force of men on the new smelting plant. The Proprietary Mine, Broken Hill, has resumed shipping desulphurized slimes to Port Pirie at the rate of about 1,000 tons a week. It is reported that working tests of the Delprat process at Broken Hill have been successful. The North Central Mine has been purchased by the Sulphide Corporation. This will give the Central Mine room to dump its tailings, something very much needed.

South Australia.—Reports from Arltunga gold-fields continue very promising. At Mount Bartlett, 6 miles east of Winneck's Depot, a reef has been developed 8 ft. wide, assaying 4 oz. to the ton. This reef has been traced for over 450 yards, and surface assays range from 2 to 7 oz. Paddy's Goose, Bartlett's, and the Junction are described as undoubtedly good properties. On the White Range Extended, tributors have found the coarsest gold yet discovered in that part of the field. Rough gold has also been found on the Golden Bluff, adjoining Russell's alluvial claims. Another good alluvial find has been made 1½ miles west of Russell's. An alluvial miner found a nugget weighing 9 oz. 11 wdt. at Winnecke's, and smaller nuggets are being found daily. Representatives of syndicates are being sent to this part of Central Australia from Adelaide, Melbourne, Ballarat, Sydney and Kalgoorlie. The population on the field is between 200 and 300, and water is very scarce.

Auckland, N. Z. March 4.

(From Our Special Correspondent.)

Gold Dredging.—Since January 1 the dredges on the Otago and West Coast fields have obtained better returns than during the corresponding period of 1902, and there is every prospect of dredging being more successful than it was last year. So far the weekly average of all the dredges has been about 2,000 oz., with an upward tendency. Until the beginning of winter, however, when the Molyneux River sinks to what is termed its normal level, no extraordinary returns are to be expected.

Quartz Mining.—A 5-ft. quartz reef, said to carry good gold, has been lately discovered in a new district, on the boundary line between Canterbury and Westland, near the head waters of the Wilberforce River.

During February the Consolidated Gold-fields Company treated 6,228 tons of stone from its Reefton mines, recovering by copper plate amalgamation £10,623; by chlorination of concentrates, £1,126, and by cyanidation of tailings £1,290; total, £13,049 ($65,245).

GENERAL MINING NEWS.

Northern Central Railway.—The coal tonnage for 1902, is given in this company's annual report as follows:

	1902.	1903.	Changes.
Anthracite	5,184,736	2,748,173	D. 2,436,563
Bituminous	2,949,595	3,816,456	I. 866,861
Total	8,134,331	6,564,629	D. 1,569,702

Of the anthracite carried in 1902, a total of 2,063,385 tons, originated on the company's lines; 1,835,551 tons being shipped from collieries on the Shamokin Division and 227,834 tons from the Lykens Valley road. The decrease in these shipments was 946,502 tons. The coal delivered at Baltimore was 578,618 tons, against 1,131,614 tons in 1901.

ALASKA.

(From Our Special Correspondent.)

Late advices from Nome report a big strike on the Shungwack River, one of the tributaries of the Kobuck, and many of the Candle Creek miners have gone to the new diggings.

Alaska-Juneau.—A tunnel to tap this mine, lately bought by the Alaska-Treadwell Company, is to be run under the charge of Manager McDonald, of the Treadwell.

ARIZONA.

COCONINO COUNTY.

(From Our Special Correspondent.)

Platinum Claims.—There are some people who believe that platinum has been found in Arizona, judging by the preparations making to mine and smelt it in the region of the Grand Canyon of the Colorado on both sides of Cataract Creek. It is stated that the ochreous deposits, which a couple of years ago were claimed to be rich in the metal, have been abandoned, and that the metal has now been found lower down the stream in the form of placers. What the size of the nuggets may be is not stated, but press accounts say that the United Gold and Platinum Company will build a 50-ton smelter in the canyon, and also a Bleichert single-track tramway from the vein in the canyon down to the site of the smelter for carrying machinery inward, and, presumably, for carrying platinum outward. The smelter is described as a late invention of Dr. Henig, especially designed for ores containing platinum. It will be located just below Beaver Falls, and about 9 miles below the Supai Indian village. The plans include the construction of an electric railroad to connect the camp with the Santa Fe or Grand Canyon railway.

A proposition to extract platinum by smelting seems strange, for if the metal occurs in placers a mechanical process would seem preferable.

GRAHAM COUNTY.

(*From Our Special Correspondent.*)

Polaris Company.—This company has taken up its option on the Evans Point mill site, near Clifton, including the 20-stamp mill, pumping plant and a number of buildings.

MOHAVE COUNTY.

Elkhart.—Manager C. Barmose, of this mine, at Chloride, reports that 7 car-loads of concentrates are going out weekly.

Mohave Gold Mining Company.—This company is installing a 40-stamp mill on its mining properties at Spear's Lake, near Kingman.

Planet Copper Mining Company.—This company's mine is about 80 miles from Kingman, and 12 miles east of the Colorado River. A discovery of a very rich gold-bearing quartz vein is reported, said to be about 9 ft. wide, and to average $6 or $7 to the ton. The discovery caused much excitement at Kingman.

Sheeptrail Group.—These properties on the Colorado River at El Dorado Canyon, are reported sold to Hayden, Stone & Co., of New York.

MARICOPA COUNTY.

(*From Our Special Correspondent.*)

Humphrey Group.—This group of 23 claims, near Morristown, has been sold to H. J. O'Brien, J. B. Forbes, D. A. Murphy and J. B. Barnett, of Kansas City, Mo.

Socorro.—This mine, near Wickenburg, has started its new milling plant with cyaniding annex.

YAVAPAI COUNTY.

(*From Our Special Correspondent.*)

Congress Consolidated Mines Company, Limited.—The new mill of 40 stamps is completed; 80 stamps are dropping. The ore is taken out by a tunnel 1,200 ft. long; it is wet-crushed and concentrated on tables. The tailings are separated into two classes, the coarse sands being treated by cyanide direct, while the fines are first roasted, then cyanided. Amalgamation is not attempted. The mill treats about 300 tons a day. The water, 100,000 gal. daily, is pumped 8 miles, from Date Creek, and raised 500 ft. The deepest workings are now 3,500 ft. on the dip. The ore is white quartz, with iron pyrite, and averages $15 per ton. Four hundred and fifty men are employed.

There are 2 parallel veins. On one, the Niagara, there are 2 shafts, 3,300 ft. apart, one is down 1,000 ft., and the other 1,300 ft. W. F. Staunton is general manager.

Crown King.—It is now proposed to treat the huge piles of tailings, estimated at 50,000 tons, by the cyanide process. It is claimed that these tailings are worth $12 per ton, and carry 15 per cent zinc.

CALIFORNIA.

AMADOR COUNTY.

(*From Our Special Correspondent.*)

The gravel claims of Baroni Brothers, Gillick & Canvin and Marsino Brothers, at Volcano, are hydraulicking, with plenty of water.

Eazy Bird.—Grading for the 10-stamp mill is in progress at this mine at Mokelumne Hill. R. Brown is manager.

Edinburg.—The new hoist on this mine is completed, and sinking has started.

Gold Standard.—A bond on this and the Louisiana quartz mines, near Mokelumne Hill, has been taken by J. F. King, and work on the tunnel is in progress.

Lightner Mining Company.—This company, at Angels, Alex. Chalmers superintendent, has paid its 25th dividend. The mine is employing an average of 80 men at about $2.75 per day.

Sargent.—The bond on this mine has been surrendered to the owners.

Sheep Ranch.—At this mine, at Sheep Ranch, there has been a small strike of the 20 miners, owing to the discharge of a foreman by the new superintendent.

Star of the East Mining Company.—This company, at Rich Gulch, has cut the east extension of the Iowa vein, and is drifting for the pay shoot. The Iowa tunnel is used by the Star of the East Company for opening the mine. Neither mine yet has a mill.

Zeila Mining Company.—This company, at Jackson, F. W. Detert superintendent, has resumed work after repairs to shaft and machinery.

EL DORADO COUNTY.

(*From Our Special Correspondent.*)

Karolyi.—At this mine, Ben F. Peters manager, at Kelsey, sinking continues. The mine was formerly the Lady Emma, and but lately resumed work after several years of idleness.

Leavitt.—At this mine, near Kelsey, as soon as the power drill plant is completed, the main tunnel will be driven on the vein.

Zimmerman.—It is reported that this mine, near Pacific House, will shortly resume work.

FRESNO COUNTY.

(*From Our Special Correspondent.*)

Fresno Mining Company.—The mines of this company, known as the Sycamore Creek placers, on Big Creek, near Kings River, have just started up under superintendence of Marion T. Childers. A 4-mile ditch, with 275-ft. fall, has been completed. The waters of Big Creek, close to the mine, are lifted into Sycamore Creek by a hydraulic elevator. The company has spent about $40,000 in putting the claim in working order. S. L. Hogue and others, of Fresno, are the lessees.

KERN COUNTY.

Baltic.—The 10-stamp mill of this mine, at Randsburg, has been running continuously since November. The main shaft is down 225 ft.

Carbonate Queen.—This mine, at Amalie, is being opened by C. E. Remy.

Milwaukee Mining and Milling Company.—This company has been organized to work the Neuzerling-Rice claim, near Hamilton camp, and is erecting houses and putting in an engine, hoist, blowers and pumps. The shaft is 85 ft. deep. The ledge is said to be wide and to run from $2 to $6 per ton by mill tests. There is plenty of water, and a mill is to be put up. The location is not far from Rosamond.

St. Elmo.—Work was recently resumed on this group of mines at Randsburg, Toppy Johnson in charge. A cyanide plant may be erected.

Yellow Aster.—This mine, near Randsburg, Chas. Wier manager, E. H. Briton superintendent, and E. H. Barton assistant superintendent, has both mills running night and day. For the first time since the mine was started there is more water than necessary, and development to give more water has stopped. The company is milling about 550 tons of ore daily.

LASSEN COUNTY.

Golden Eagle.—At this mine of the Lassen Mining Company, at Hayden Hill, E. H. Benjamin, of Pine Street, San Francisco, manager, an average of 70 tons of ore per day were treated in February. The ore is crushed in a roller mill and then cyanided. The percentage of assay value recovered is remarkably high. The company is having some trouble at the mine, owing to the organization of a miners' union, though the miners confess they had no grievance against the company, which was and is paying the highest wages.

MOHAVE COUNTY.

Karma.—Grading is being done for a 40-stamp mill near this mine, at Mohave. Thompson & Boyle have 12 men at work, and have secured the water rights on the property of Mrs. Ruby, near Cameron. Pipes are being laid to bring the water to the mill.

Mesquite Springs Gold Mining Company.—This company's claims at Mesquite Springs are to be developed. The tunnel for the Star of Hope Mine is to be extended at once. The company owns 7 claims and a 3-stamp mill.

NEVADA COUNTY.

Brunswick.—The steam pumps at this mine, near Grass Valley, C. H. Mallen superintendent, are to be replaced by electric pumps.

Murchie.—This mine, at Nevada City, being reopened after a long period of idleness, lost its old 8-stamp mill by fire on March 20. The mill was recently put in order to serve as a makeshift while the mine was being prospected.

PLACER COUNTY.

Crandall.—At this mine, near Auburn, F. Hartley superintendent, the 5-stamp mill is running.

Eureka.—An aerial cable is to be put up to convey the slate from these quarries at Kelsey to Placerville.

PLUMAS COUNTY.

Toland.—J. M. Engle, of Quincy, has recently bought the Rush Creek property, the Toland Mine and the Colonial group, near that place.

SACRAMENTO COUNTY.

Folsom Development Company.—Two dredges are to be built for this company near Folsom, and another for the Ashburton Company at the same place. One of the dredges will be put on the Bendel place and another on Texas Hill. The Ashburton dredge will be located at Sailor Bar, almost within the city limits of Folsom.

Hupp & Roberts.—At this drift mine above Folsom, owned by Mr. Hupp, of Weaverville, and Capt. Roberts, of Sacramento, about a ton of gravel is raised at each load of the skip in the incline shaft.

Natoma.—The company which recently acquired the lands of this company, near Folsom, has 3 prospecting drills at work on the dredging ground, and will get two more.

SAN BERNARDINO COUNTY.

The new mining camp of Stagg is 53 miles from Barstow, and 8 miles from Ludlow. There is not much water at hand, and what there is is controlled by one man. No ore running less than $15 per ton is milled. Grading for a railroad from Ludlow is completed.

Gold Peak Mining Company.—This company, at Victor, is installing a cyanide plant and a 5-stamp mill.

O. K.—This group of claims at Dale is reported sold. The purchasers will equip the property with a mill and cyanide plant.

SAN DIEGO COUNTY.

Ranchita.—This mine, at Banner, is under option to Charles Wellbourn, who is cleaning out the old workings.

SHASTA COUNTY.

California Mining Company.—This company, at Horsetown, has its electric dredge at work. Dr. T. H. Heintz was in charge of construction. A number of farms on Clear Creek are under option.

Eastman Gulch.—T. M. Fleming is milling ore from his mine in Gifford's arastra. Development work is being done on the Richards group, where a mill is to be erected this spring. A new find has been made by G. Ehrmen on the old Knob mine. The Slater Brothers are running an arastra on ore from the Last Chance. L. W. Pierson and George Simmons are running Tunnel No. 4 ahead on the Benicia Mine.

SIERRA COUNTY.

Australia.—Richard Phelan is operating this mine at Slug Canyon, near Downieville. The lower tunnel is to be run on contract instead of day's work.

Commodore.—This mine, at Barkhouse Creek, is to be reopened by Milwaukee men. The mine was formerly owned by the late Thomas Mein, and has been idle since his death.

Tyrer.—This mine, at Hornbrook, C. W. Tyrer manager, will soon start up again.

SISKIYOU COUNTY.

Jillson.—This quartz mine, near Hornbrook, has started again after a period of idleness. C. B. Jillson is owner. Fifty men are employed.

TRINITY COUNTY.

Brown Bear.—Local papers announce that this mine, at Deadwood, is to permaenntly close in July. The mine has been worked for many years, and was a large producer.

Dorleska.—Work at this mine, H. Z. Osborne general manager, J. H. McIlwaine superintendent, has gone on without interruption during the winter with 30 men. The shaft has been sunk 120 ft., and the station for the 4th level, at 300 ft. from surface, is being cut. The mill has run steadily. A new 5-stamp battery will be in operation before the end of March. This mine has been distinguished by its rich ore, and its managers state that it never looked better than now. It is a regular producer.

Lappin.—This mine, at Deadwood, is to be opened on a more extensive scale by J. J. Chambers, who holds a bond. The mine has been a producer, but will be more fully equipped. New hoists and pumps are to be put in.

Yellow Rose of Texas.—The James J. Chambers Company, of Redding, has bonded this mine at Dorleska, from George D. Carr, Albert Miller and the Misses Ryder. Men are to be set at work on April 10. A 1,000-ft. tunnel will be driven to cut the ledge at a depth of 350 ft. below present workings. The property consists of 11 locations, and include 860 acres of mining and timber land. There is a Huntington mill, concentrator, buildings, etc., on the claim.

TUOLUMNE COUNTY.

Altadena.—This mine has shut down, though a new mill was recently completed.

Grizzly.—At this mine, at Carters, W. R. Hall superintendent, the 20 stamps are running on ore from the new shoot recently struck.

McAlpine.—At this mine, near Big Oak Flat, S. E. Rigg is superintendent. The 2-compartment shaft has reached 300 ft., and sinking continues. A gallows frame has been erected and a hoist will soon be put in.

Poison Oak.—This mine, formerly owned by the Ribbon Rock Mining Company, now belongs to the Yankee Hill Gold Mining Company. The shaft is to be cleared and some prospecting done, and if results are not satisfactory the 5-stamp mill will be moved to the Vine Spring Mine.

Punter.—At this mine, H. J. Dykes superintendent, a new boiler and pump are in place, and men are repairing the old shaft.

Republican.—High-grade ore is reported found on the 500-ft. level of this mine at Jacksonville.

Santa Ysabel.—After a long shut down this mine at Stent, is to resume work. Grading is under way for starting an inclined 3-compartment shaft.

Star.—This mine, at Columbia, E. J. Olsen superintendent, has high-grade ore on the 400-ft. level. The former owners quit work within 15 ft. of this new discovery.

Star King.—This mine, at Carters, it is said, will start up again shortly under the superintendence of C. A. Holland.

Vine Spring.—This mine, near Columbia, owned by the Yankee Hill Gold Mining Company, is opening its ground by 2 tunnels.

YUBA COUNTY.

Honeycomb.—This mine, near Camptonville, has closed down, the ground being unprofitable.

COLORADO.

CHAFFEE COUNTY.

Gold Bug.—A pump has been ordered in order to unwater this mine, near Turret. The Par Value Mining Company is operating the property.

Salida Gold and Copper Mining Company.—The site for the 100-ton leaching plant to be erected to treat the ores from the Sedalia Mine, near Salida, has been selected near the river and railroad. E. B. Green is to have charge of the construction.

CLEAR CREEK COUNTY.

Treasure Mountain Mining Company.—This company has been incorporated to work the Mary Ann group at the head of Geneva Gulch, near Georgetown. Charles C. Goodale is president of the company; Van B. Straight, E. C. Gard, of Denver, and Missouri parties are interested. The company intends to erect a large concentrating plant on Geneva Creek, near the property for the treatment of the low-grade ore. A cross-cut tunnel is to be driven through a number of the veins, and a 2-compartment shaft sunk on the Mary Ann.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

McFarlane & Co., of Central City, and Black Hawk, Colo., have shipped a car-load of mill supplies to W. S. Tevis, Williams, Cal., consisting of Gilpin County bumping tables, etc.

Black Diamond Mining and Development Company.—Detroit, Mich., parties are interested in this company, which has just purchased the interests of D. O'Sullivan in the Friend group of 9 lode claims, in Lump Gulch, Central Mining District, about 10 miles north of Central City, the consideration being equivalent to $20,000 or $25,000. The main shaft is down only 50 ft., but shows a good vein, the ores being largely refractory. Mill returns show values of $5.50 per ton, and smelting ores run as high as 3.72 oz. gold, and 2.30 oz. silver per ton. Sinking will start immediately. G. D. Kaye, Gilpin, will be in charge.

Courtlandt.—Eastern parties are going to take hold of this property under a lease and bond. The group once was a first-class producer, but seems to have been neglected of late years.

Gold Dirt.—Pittsburg parties, as the Pittsburg Consolidated Mining, Milling and Tunnel Company, have taken a long term lease on this property in Independent District, near Perigo, about 9 miles north of Central City. The property was one of the oldest discoveries in the northern sections, and is credited with producing over $1,000,000 principally in gold from workings near surface. The deepest workings are now only 500 ft. The company has added to the machinery, installed a station pump and is sinking with double shifts, intending to go down 200 ft. The company has decided to put in a surface tramway between the mine and the Perigo Mill, a distance of about ¾ mile. J. R. Anderson, Bank for Savings Building, Pittsburg, Pa., is president of the company, and David Ellis, Perigo, has charge of the underground work.

Golden Rod Mining and Milling Company.—Chicago parties own a group in the Silver Lake District, and will install machinery on the Pet lode, the shaft on which is down over 50 ft. John J. Lillif, Central City, is in charge.

Ingalls Gold Mining and Leasing Company.—A rich strike has been made in the Straub shaft, at 340 ft., a 1-in. streak showing 96 oz. gold and 15 oz. silver per ton. Eastern and Denver parties are interested. Sinking is going to a depth of 500 ft. W. Ballantyne, Central City, is in charge.

Missouri.—Denver and Eastern parties are figuring on starting up this property in Russell District, under a lease and bond. Its main shaft is down about 400 ft., and up to a few years ago the property was a consistent producer of fair grade ore. Water caused a suspension of work. Denver parties are the owners.

West Flack.—A local pool has repaired the shaft of this quartz Hill property. Developments have started at a depth of 200 ft., where shipments will start soon. E. W. Davis, Central City, is manager.

Wood.—Local parties have taken a lease on this uranium property in Leavenworth Gulch. The ores once were shipped to London, England, the price of the mineral being $1 per lb. for all ores carrying 50 per cent in uranium. The property is credited with a very fair production of pitche blende, and the local parties will develop it thoroughly. A. Christopher, Central City, is in charge.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Leadville Ore Production.—There have been a number of new and important strikes during the first quarter of 1903, the known area of mineralization has been extended and the smelters are handling low-grade material. The new Resurrection mill has proven the success of magnetic separation, while experiments now going on with the cyanide process will, it is believed, enable lower grade material on the gold belt to be worked. Among the most important results this year are the discoveries of ore-bodies in the Diamond and the Little Bob; the approach of the Yak Tunnel into Ibex No. 4 ground; the recent rich finds by the Leadville Home Mining Company; the consolidation and new work of the Midas-Northern-Coronado properties, and finally the activity of the manganese market.

Leadville Manganese Market.—After taking no ore for a year the Pueblo Steel Works have closed a contract for 125 tons daily of manganese from the Sixth Street, the Grofton, Catalpa-Crescent and the Yankee Doodle, calling for a minimum of 25 per cent manganese and 25 per cent iron with a maximum of 8 per cent silica. The Cloud City will shortly begin manganese shipments.

A. M. W. Mining Company.—The Wolftone property has increased shipments from 100 to 150 tons daily of lead sulphides. The two mills are handling several hundred tons daily satisfactorily.

Bartlett.—A 1,200-ft. tunnel is to get under the ore and handle the water. The tunnel will be completed during the summer, and is cutting some of the richest veins of the Sugar Loaf section.

Boulder Mining Company.—This New York concern is operating under the management of Timothy Kyle on virgin territory in Big Evans Gulch. A new shaft on the White Cloud claim at a depth of 400 ft. is in highly mineralized porphyry.

Diamond Gold Mines Company.—The new strike has opened out well, and the ore bins are filled preparatory to steady shipments.

Fanchon.—A good vein is said to be exposed, some of which is high-grade material.

Fryer Hill Mines Company.—Shipments for March averaged up to over 3,500 tons, the greater part from the El Paso. The pumps are handling 500 gals. a minute. The new shaft on the Pride of the West claim going after the Progressive ore shoot, is down 253 ft., and a small pump is being put in. Several diamond drill holes are being sunk in new territory.

Gold Basin Mining Company.—In addition to driving new prospecting drifts 2 lots of ore have recently been shipped from the main vein that showed 4 oz. gold, 80 oz. silver and 10 per cent copper. The vein is very small, but remarkably rich.

New Year.—This Dewey section shaft is showing a very fine new ore-body at 200 ft.

Penn Mining Company.—Reduced treatment charges on siliceous ore have enabled this combination to increase shipments to 80 tons daily.

Progressive Mining Company.—The ore on the new lead strike has been followed 150 ft. through the Cady workings; 125 tons were taken out during March. A drill hole is to be sunk from the bottom of the new shaft on the Olathe placer.

Toledo Avenue Mining Company.—Operations have resumed on the Toledo after a long idleness. The work is under the direction of Andrew Dyatt.

Two Bit Mining Company.—At a special meeting the capital stock was increased from 100,000 to 150,000 shares. The new shaft is down 378 ft.

Yak Mining, Milling and Tunnel Company.—The tunnel has reached Ibex No. 4 shaft. The breast of the tunnel is now 11,000 ft. from the mouth, and about 1,350 ft. from the surface.

OURAY COUNTY.

Camp Bird, Limited.—The manager's report for February says that the mill at Ouray crushed in that month 5,574 tons of ore, which yielded $104,501 in bullion, and 352 tons of concentrates, valued at $20,624, while the cyanide mill from 3,080 tons of tailings yielded in bullion about $9,610, making the total estimated product, $134,735. The working expenses and development were $53,832, leaving the estimated net profit at the mine, $80,903.

SAN JUAN COUNTY.

(*From Our Special Correspondent.*)

Big Five Mining Company.—Contracts of 500 ft. each have been let on this company's Tower Mountain and Galena Mountain properties near Silverton to Spears & Leonard.

Champion.—The 800-ft. cross-cut, near Silverton, has opened a vein supposed to be the Champion, and drifting has started.

Continental-American Gold Mining Company.—This company was recently organized in New York City, with a capital stock of $2,500,000, to work in Corkscrew Gulch, near Silverton. The properties were recently purchased from F. J. Hulaniski for $100,000. Several new buildings are being erected and shipments will begin May 1.

Emerald Lake.—The 1,000-ft. cross-cut is expected to cut the vein July 1. The property is owned and operated by Ephraim Lissner, of Silverton.

Flint Bonanza King Mining Company.—This company is to work the Beatrice, Contention and Manners claims near Silverton.

Green Mountain Mining Company.—The tunnel has cut through the International vein, which shows good shipping ore, and will be continued to some of the larger veins.

North Star Group.—Men are busy in the Sultan Tunnel, the eastern workings of the North Star group, near Silverton. The tunnel has been abandoned for many years, but will be used to develop the Gladstone group also.

Sunlight Mining Company.—A large force is busy on the Evening Star group, near Silverton, and more men will be added as soon as the ground is opened up.

SAN MIGUEL COUNTY.

Keystone Hydraulic Mining Company.—This company is reported preparing to bring suit against the various mining companies at Telluride for damages. The managers of the Smuggler-Union, Liberty Bell, Tomboy and Japan companies have been notified by C. M. Coleman, manager of the Keystone Hydraulic, that he is to file suit for damages alleged to have been done to the Keystone placer mines by tailings discharged into the San Miguel River by these companies. The Keystone Company claims that the sand from the stamp mills is wearing on the hydraulic pipe and other machinery, and that the deposit of tailings has ruined the retaining reservoir. It will sue for injunction restraining the mining companies from turning the tailings from its mills into the stream.

(*From Our Special Correspondent.*)

Carribeau-Montezuma Mining Company.—It is reported that on March 16 Charles S. Newton, of Ophir, resident manager, received a remittance of $50,000 as first payment on the sale of the Carribeau & Montezuma group to New England men, residing principally in Boston. It is said also that the property has been turned over to F. P. Axtell, one of the purchasers, as resident manager. The total price is not known, but is said to be $350,000. The Carribeau & Montezuma is a concentrating proposition, the ore running in gold, silver and lead. It has been worked in a rather conservative way, though the mines are splendidly developed. It is understood the new owners will erect a large concentrating plant having a capacity of 150 or 200 tons daily. There is a 10-stamp concentrating plant on the property, which has a capacity of 40 or 50 tons daily. A cross-cut tunnel, 1,400 ft. long, starting near the mill building, cuts the Carribeau & Montezuma vein at a vertical depth of 1,600 ft. There is a raise to surface, and at intervals of 100 ft. drifts have been run on the lead.

Keystone Hydraulic Mining Company.—The 2 10-in. hydraulics will soon be washing gravel, and this season is expected to be very profitable. Recently a tunnel 400 ft. long was completed, connecting with the bottom of a pit sunk to bedrock. A flume with riffles is being placed, and the gravel will be washed out through it, greatly reducing expense. The dirt near the bottom of the pit runs from 50 to 75c. per yd. The flume, which delivers water to the 2 pipe lines, is large enough to carry the whole of the San Miguel River. The water has a fall of 500 ft. from the penstock to the 10-in. nozzles.

TELLER COUNTY—CRIPPLE CREEK.

Dump.—Local parties are working under a lease, at a depth of 200 ft. The milling ores range from 2 to 2½ oz. gold per cord, and the last shipment of smelting ores gave values of $118 per ton. L. Arrighi, of Central City, is the owner.

(*From Our Special Correspondent.*)

Strike Situation at Cripple Creek.—The situation is somewhat improved, but not yet settled. A number of concessions have been made by both sides. The Standard Mill in Colorado City is running in part, operated by non-union men, the union men being out. At present the mines shut down are the Stratton's Independence, Golden Cycle, Elkton, Isabella, Gold King, Granite and Thompson. About 1,000 men are out. At present it seems as though the strike at the mill would be settled, as all the demands of the union men at the mill have been met

with, except as to the reinstatement of some of the striking mill men. If the trouble is not settled very soon a number of mines will have to close from having no market for their ore. The Vindicator will close April 1, unless settlement is made. The Hull City Placer of the Independence Consolidated is also expected to close soon. Should the strike trouble blow over the outlook for the district is quite good for the coming summer.

IDAHO.

KOOTENAI COUNTY.

Panhandle Smelting and Refining Company.—This company, according to its promoter, H. M. Williams, is to build a smelter at a site 2 miles east of Sand Point, on the Northern Pacific Railroad, on Pend d'Oreille Lake, and within a mile of the tracks of the Great Northern. The smelter is to have a capacity of 300 tons per day, and is to treat ore from claims about the lake in the Lake View, Black Tail, Granite Creek and Trestle Creek districts. Coke will be secured from the Crows Nest Pass ovens. A townsite, Panhandle, is to be laid out by a subsidiary company, and another subsidiary company is to run tugboats on the lake for bringing ore to the smelter. W. E. Nelson is secretary and treasurer of the company. The promoter claims that work is to start at once, and that the plant will be in operation by September. He also says that Paul Johnson, late superintendent of the Greenwood Smelter, is to have charge of construction.

SHOSHONE COUNTY.

United States Judge Beatty, on a motion by the Empire State-Idaho Mining Company, for an injunction to restrain the Bunker Hill Company from working a portion of the segment of the vein covered by the Stemwinder property, rendered a decision by which both of the litigants are permitted to proceed with their work. After setting forth how the parties shall work in disputed territory, the judge ordered that neither parties to the action shall mine or extract ore from the segment in controversy. Ore is of necessity removed therefrom in running shafts, drifts or other workings allowed by the order, but such ore shall be speedily converted into money in the usual manner by the party removing the same, and the gross value thereof, above freight and smelting charges, shall be deposited with the clerk of the court, together with a full and accurate statement of the amount and value thereof, verified by the manager or superintendent of the party removing the same, and said money shall be retained by the clerk in his official capacity, to be distributed in accordance with final adjudication of the cause.

American Company.—This company has about 10 miles of ground along Oro Fino Creek, below Pierce, and a hydraulic elevator with a daily capacity of 2,500 cu. yds. ready to run. The company is putting in a 6-mile ditch to carry 1,500 miner's inches of water, and give 300 ft. pressure at the works. The company expects to start work April 1 with a large crew.

Fidelity Gold Mining Company.—This company is preparing to work a group of claims on French Creek. A crew of 10 men is completing the flume and ditches, and will be ready to mine by the time the snow melts.

Musselshell Company.—This company, composed of Detroit, Mich., men, bought the Musselshell claims, near Pierce, last fall, and will start work as soon as the snow is gone, probably by May 15. It will take about 4 months' work with a large crew of men to get things in shape to move gravel. The company will have to construct 6 miles of ditch to carry 1,200 miner's inches of water, giving over 300 ft. pressure.

Pierce-Chicago Company.—This company, above Pierce is installing a hydraulic elevator plant, and has its ditch completed, and the elevator plant is ready to be shipped in as soon as the roads are in condition. The company is expected to be moving gravel not later than July 1.

Rich Hill Company.—This company has bought a pumping plant for its hill diggings, but cannot haul it in until the roads get passable for heavy teams, about May 15.

INDIANA.

Coal Miners' Wages.—The miners in the bituminous districts have declined to accept the operators' terms that last year's agreement shall continue, with the exception of granting a 12½ per cent increase, as determined by the Indianapolis convention.

CLAY COUNTY.

(From Our Special Correspondent.)

Hoisting Engineers' Wages.—The Brazil coal operators' offer of a 12½ per cent increase in wages over last year, and leaving all other conditions as the present scale, has been accepted by the hoisting engineers. The concession increases their monthly wages of $65 and $75, $8.12½ and $9.37½, respectively. The engineers made several other demands which were refused.

MICHIGAN.

Coal Miners' Strike.—A general suspension of mining on April 1 was ordered by the president of the Michigan District of the United Mine Workers, pending the outcome of a conference between the operators and the miners. The point in dispute is the pushing of coal cars in headings, the miners claiming an allowance for this in all cases, even where company hands do the work.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Champion.—The new blacksmith and machine shops are nearly completed. They are constructed of sandstone, and a railroad track runs through both.

Franklin.—Nos. 5 and 3 shafts at the old mine are shipping 350 tons of rock daily. At the Junior branch a cross-cut is being driven west from No. 1 shaft at the 4th level in hopes of finding a copper-bearing lode.

Isle Royale Consolidated.—Mining is confined to No. 2 shaft, which is producing 500 tons of rock daily from the Isle Royale lode. Diamond drill work continues.

Osceola Consolidated.—At the old branch of this mine No. 5 shaft is down to the 40th level, and No. 5 to the 38th level. Nos. 3 and 4 shafts are still closed down. Thirty-five drills are in commission, and the daily production averages 1,000 tons of rock. The new 35-drill air compressor at the North Kearsarge is in commission. The old compressor is being removed to the new building. Six additional drills are in commission.

Quincy.—The Chilean mill installed at the stamp mill at Mason for regrinding the coarse sands is giving satisfaction, and saving considerable copper. It was made by the Trent Machinery Company, of Salt Lake City, Utah.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Mohawk.—This company will install another head at its stamp mill at Gay, on Traverse Bay, and may have it in commission by October. No. 4 shaft will have a permanent hoisting equipment.

Seneca.—Favorable developments on nearby properties has led to a revival of interest, and work may be resumed this summer.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

Federal Lead, Zinc and Smelting Company.—This company has contracted for the purchase of the property of the Two O'Clock Mining Company, a 4-lot lease on the land of the Granby Mining and Smelting Company, northwest of Joplin, for $12,500, with a provision that the purchasing company shall install a concentrating mill within 60 days.

United Zinc Companies.—This concern has a new strike of zinc ore in a drill hole from the 170 to the 215 ft. on its recently acquired tract of land southeast of Duenweg. A shaft sinking on a previous drill hole that did not mark ore until the 150-ft. level, has encountered pay dirt at 142 ft. The drill indicates ore to 219 ft. At Aurora this company has recently found ore underlying the old workings in several places, the last from 186 to 215-ft. depth. The company expects to keep the drills at both locations going all summer.

NEWTON COUNTY.

New Jersey Zinc Company.—This company has purchased 1,257 acres more of land in this county, the land lying west of Granby.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Desloge Lead Company.—This company is putting in machinery to increase its milling capacity from 600 to 1,000 tons daily. Its new No. 4 shaft is about to start mining a very fine new body of ore. The blast furnace is shut down, the surplus concentrates that the five Flintshire furnaces are unable to smelt, going to the Markle Smelter at East St. Louis.

Missouri Southern Railroad.—This road is running into Elvins, the heart of the Flat River District.

St. Joe Lead Company.—This company is now operating a compressed air locomotive underground to replace the mule system. This later may result in the abandonment of several shafts.

MONTANA.

(From Our Special Correspondent.)

The State Legislature adjourned without making any appropriation for a State exhibit at the St. Louis Fair. As several private citizens have offered to contribute $1,000 each, and President Scallon has proposed to give $5,000 on behalf of the Amalgamated Copper Company and $1,000 in his capacity as an individual, it looks now as though it would be an easy matter to raise $50,000. This sum it is thought, will suffice for a very creditable State exhibit.

MADISON COUNTY.

(From Our Special Correspondent.)

Chicago Mining and Development Company.—This concern will have 2 dredges in operation this season on the Conwey ground near Virginia City. Last year the company equipped its diggings with a machine shop and foundry plant, which will enable it to make all repairs on the ground.

Kennett Mining Company.—This company contemplates erecting a 30-stamp mill this summer. The mill will be built near Virginia City. The question of building the mill hinges somewhat on the attitude of the labor unions of that locality. The company will stand no more unreasonable dictation, preferring to close its mines.

Mollie Gibson.—This dredge, which has worked two seasons on the Conwey ground, below Virginia City, under a lease, is to be completely overhauled, and have heavier machinery added. The Chicago company that owns the dredge claims to be making better profit on Alder than was made at the first location near Bannock. It is understood that the present lease runs until the end of this season.

POWELL COUNTY.

(From Our Special Correspondent.)

Arnold.—This mine is reported to have opened a good body of copper ore in a winze from the tunnel level. The mine is about 10 miles from Elliston, on Snowshoe Gulch.

Gold Dredging Company of America.—This company, which has been operating 2 dredges at the old placer camp of Bannock for some years, has worked out all the pay ground and is prospecting several pieces of probable dredging ground in other localities. The company has arranged to place a Keystone driller at work on the lower end of Gold Creek, below the old Pioneer Diggings, about 1½ miles from Gold Creek Station, on the main line of the Northern Pacific Railway.

PENNSYLVANIA.

ANTHRACITE COAL.

Temple Iron Company.—At the recent annual meeting, George F. Baer was re-elected president and A. F. Law, of Scranton, Pa., secretary and treasurer. The directors are E. B. Thomas, president of the Erie Railroad; W. H. Truesdale, president of the Delaware, Lackawanna & Western Railroad; Thomas P. Fowler, president of the New York, Ontario & Western Railway; R. M. Olyphant, president of the Delaware & Hudson Company; George F. Baer, president of the Central Railroad of New Jersey; Joseph S. Harris, of the Reading Railway; J. Rogers Maxwell and Major I. A. Stearns. S. B. Thorne resigned as general manager and Frank Hennelreich was promoted to the general superintendency and will perform the duties of general manager. A. F. Law, who has been secretary, was promoted to be vice-president and treasurer.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Alder Creek Mining Company.—The 60-ton cyanide plant on Yellow Creek is reported producing from $8,000 to $10,000 a month. The ore is shale, porphyry and Cambrian quartzite, worked in open pits.

Golden Reward Mining Company.—Mining has been resumed at the Tornado, Fannie, Sundance and Double Standard mines, with nearly normal forces employed. The company is shipping 150 tons a day to its cyanide plant at Deadwood, and 60 tons a day to Denver and Helena smelters. The smelter at Deadwood is cleaning up the ore accumulated prior to the strike, but the management says the plant will not resume regular operations at present.

Hidden Fortune Gold Mining Company.—The hoist at the Bingham shaft has been destroyed by fire; loss, $40,000; insurance, $25,000. The fire started in the drying room, presumably from the explosion of a lamp. The company has ordered the erection of another shaft house 60 by 120 ft., a new flat cable drum hoist capable of 1,000 ft. lift, electric lighting plant, and air compressor for 25 drills. It is claimed that the destruction of the hoist will not interfere with starting the new mill.

Horseshoe Mining Company.—Five hundred tons of ore accumulated before work was suspended, have been shipped to the Imperial plant at Deadwood.

Portland Mining Company.—N. W. Chapman has resigned as superintendent, and H. S. Vincent, of Deadwood, succeeds him. The Clinton Mining Company is under the same management. The Portland is shipping to the Rossiter cyanide plant at Deadwood.

University Gold Mining and Milling Company.—A new body of ore is reported found on the South Dakota group. The company may build a mill this year.

TENNESSEE.

MAURY COUNTY.

American Phosphate Company.—At the chancery sale at Columbia this company's property was bought by the Eastern bondholders for $52,500. The bonded portion of the property brought $50,000; 2,600 acres of land in Lawrence County, $1,000, and the lands in Maury County, not under mortgage, $1,500.

The plant is modern and the phosphate land of good quality; together they originally cost $225,000. The company will be reorganized, and the property worked immediately.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Shipments.—For the week ending March 27 the Salt Lake banks report the following settlements: American Smelting and Refining Company, bullion $194,400; gold, silver, lead and copper ores, $201,100; gold bars, $25,000; total, $420,500.

BEAVER COUNTY.

(From Our Special Correspondent.)

Ben Harrison.—The shaft of this property, near Milford, is nearly to the O. K. level, and is encountering sulphide ores. Water level has been reached.

Copper Mountain Company.—Manager B. T. Lloyd states that the foundation for the new hoist is laid, and work of erecting machinery will start in 10 days.

Frisco Shipments.—For the week ending March 27 the Horn Silver sent out 5 cars of ore, and the Wild Bill 1 car.

BOX ELDER COUNTY.

(From Our Special Correspondent.)

Century.—The mill on this property was not burned, though a telegram from Kelton, the nearest station, stated that it was. The presumable object was secured, for the stock dropped the next day.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending March 27 the receipts at the samplers were: Mammoth, 15 cars; Star Consolidated, 1 car; Gemini, 12 cars; Bullion-Beck, 2 cars; Tetro, 2 cars; Grand Central, 22 cars; Uncle Sam, 3 cars; Victor Consolidated, 3 cars; Ajax, 2 cars; Yankee Consolidated, 10 cars; Plymouth Rock, 1 car; Martha Washington, 1 car.

Star Consolidated.—This Tintic property has struck a body of gold ore in the 300-ft. level, it is reported.

South Swansea.—The rumor that this Tintic property will resume work is unfounded. There is no intention, with silver at the present price.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated Smelter.—For the week ending March 27 the shipments East amounted to 120,000 lbs.

Highland Boy Smelter.—For the week ending March 27 there were shipped East 4 cars of copper bullion, aggregating 240,000 lbs.

Kempton vs. United States Company.—Judge Ryner has given a decision in favor of Kempton, or Col. E. A. Wall et al., and against the United States Mining Company, which has appealed.

United States Smelter.—For the week ending March 27, 1903, the total shipments East were 304,502 lbs. of copper bullion.

York.—Something of a strike is reported in this Bingham property. A fault found while drifting under the old ore bodies, when followed, revealed a vein of galena which is thought to be a lead to the old ore shoot.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—For the week ending March 27 the Mackintosh Sampler reports the receipt of 2,936,910 lbs. of ore from the Daly West.

Comstock.—This Park City property expects to have its new mill running about April 1.

Daly-Judge.—The new mill is settling down to work admirably. The present tonnage is 150 mine cars daily. No shipping is done, owing to unfavorable roads.

Nail Driver.—Work on the new hoist is pushed.

TOOELE COUNTY.

(From Our Special Correspondent.)

Stockton Shipments.—For the week ending March 27 the Ophir Hill sent out 6 cars of concentrates.

Christmas Group.—A strike of horn silver in copper ore is reported.

Four Metals.—This Dugway District mine is soon to have a mill. The contract is to be awarded, it is said, in a few days.

Galena.—Some of the material for the new hoist to replace the burned one has been shipped to this Fish Springs District property.

Grand Cross.—This Stockton property is completing an upraise to tap the ore bodies in the upper levels.

Lucy L.—F. L. Wilson, of this Deep Creek property, states that work will soon be resumed, and that supplies are on the road. A large force of men will go on this season.

Sacramento.—This Mercur property has declared a dividend of ½c. per share.

WEST VIRGINIA.

MONONGALIA COUNTY.

Coal Miners' Strike.—All the coal miners in the Pan Handle District are reported out on a strike to secure a 12½ per cent advance in wages.

FOREIGN MINING NEWS

CANADA.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Coal Miners' Strike.—According to a press dispatch the strike of the coal miners in the employ of the Crow's Nest Pass Company at Fernie and Morrissey has been settled. The terms of settlement are not given.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Production.—According to the Rossland *Miner* shipments for the week ending March 21 and for the year to that date are as follows:

	Week. Tons.	Year. Tons.
Le Roi	3,500	45,941
Centre Star	1,440	17,390
War Eagle	1,050	12,245
Giant	....	335
Velvet	150	1,891
Kootenay	....	225
Le Roi No. 2	700	4,759
Homestake	....	90
Totals	6,840	82,876

NEW ZEALAND.

Exports of gold and silver in January are reported by the Mines Department, as below:

	1902.	1903.	Changes.
Gold	32,860	48,770	I. 15,910
Silver	36,375	62,343	I. 25,968

The gold bullion this year was equal to 44,660 oz. fine gold, or $923,120.

SOUTH AMERICA.

BRAZIL.

St. John del Rey Gold Mining Company.—This company reports for the month of February a total gold production valued at $125,073. The average yield was 0.64 oz. gold per ton.

ECUADOR.

Playa de Oro Mining Company.—This company's property in New York has been attached by the sheriff in favor of Otis S. Gage for $49,685 and interest for several years, making the total amount of the claim nearly $70,000. The sheriff levied on the books and papers of the company at its temporary office, 80 White Street, New York City. The attachment was granted on the ground that it is a Kentucky corporation. Mr. Gage claims that the company owes him the above amount for the proceeds of 2,000 shares of stock, which he let the company have on November 8, 1895, and was to be repaid to him in case the company's property was subsequently sold or a reorganization took place. The property was sold under foreclosure on December 16, 1902, for a mortgage of $200,000, and a bondholders' committee has a reorganization under way.

MINING STOCKS.

(Full quotations are given on pages 545 and 546.)

New York April 1.

The copper shares have given another performance under the direction of the pools, and at one time the market nearly lost its equilibrium by causing heavy liquidation of holders, who had anticipated better things. However, when prices were dangerously near to the low mark of this year, professional operators changed their tactics and soon sent the market upward.

Amalgamated Copper quotations varied over three points this week, from $68⅛ to $64⅝; but at the close the stock is held at $67¼. Anaconda moved sympathetically, selling at $29@$27, and closing at $28. The curb coppers have had their innings in accordance with the dealings in shares on exchange. Greene Consolidated, of Mexico, has weakened to $23⅜, and British Columbia to $5. Tennessee has been supported at $30@$30.75, while White Knob, of Idaho, made small sales at $10.25@$11.

Gold and silver shares have also been weaker, as a result of the Colorado mill and smelter men's strike, and the continued unsatisfactory financial position of the Comstock companies. Portland, of Cripple Creek, Colo., is off at $1.40, while Isabella is down to 20c., and Elkton to 37c. Ontario Silver, of Utah, has lost, 330 shares being sold at $5, which is the lowest price in a long while. Undoubtedly the passing of the March quarterly dividend has caused this fall. Daly, also of Utah, is selling at $2.95. Standard Consolidated, of California, made a sale of $3.40. Consolidated California & Virginia, Overman and Ophir, of the Comstock list, are selling at a difference of 10c., and all show a recession from last week's prices. The other Comstock shares are uninteresting, except that they have declined proportionately.

Boston. March 31.

(From Our Special Correspondent.)

Mining shares have again suffered in sympathy with the continued liquidation in the general stock market, yet recessions are slight as a rule. Of the purely local stocks Copper Range Consolidated has fallen the most, dropping $7.50 to $61.50, rallying to $64 subsequently.

There is a very firm tone in Utah Consolidated, and it looks as if the stock was being steadily absorbed. It closes the week a fraction higher at $29.50, although it touched $28. Centennial dropped $3 to $24, with a sharp recovery the same day to $26.37½. Bingham has fallen $2.50 to $30.25. Osceola fell $4.50 to $68; Tamarack $17 to $157; Mohawk, $4 to $50.50, the latter rallying to $52.62½. Parrot fell over $3 to $28.25 on very light dealings, recovering $1.25. Winona slid off $2.75 to $9.50, recovering $1. The Winona annual report shows receipts of $103,771 for 1902, of which $90,744 was assessment money. Expenditures were $55,061, and the balance on hand, December 31, was $39,093. Since then $1 per share, or $100,000, has been paid in.

Calumet is about the same at $530.

The $10 break in Dominion Coal to $106 must be mentioned, as that of $7.50 in Dominion Iron and Steel of $25. The former rallied to $110.50, and the latter to $28.25. There has been steady liquidation, particularly in the latter. There is talk that the Dominion Coal dividend will be cut from 8 to 7 per cent. The fire in the mines has been more serious than first anticipated.

Good support has been given United States Mining and the closing is off but 25c. from a week ago, at $24.50. St. Mary's Mineral Land has been freely offered at $60, with $55 the best bid.

Colorado Springs. March 28.

(From Our Special Correspondent.)

The mining stock market has shown a decided improvement during the week, anticipating a speedy and favorable settlement of the labor troubles; but it looks to-day as if the felicitation was premature. Stocks responded promptly as soon as the pressure was removed, and an improvement in the trading was at once noted. From Tuesday onward the volume of trading steadily increased until to-day the sales in the mines list were almost double those of a week ago.

El Paso, which sold at 57⅛@57¼c. a week ago, closed to-day at 56½c., after having touched 56c. during the week. Elkton sold at 34¾c. on the 23d, to 33c. on the 26th, and up to 35⅞c. to-day, closing strong. Isabella sold at 17½@17c., and back to 18½c. to-day, closing in good form. Vindicator sold at $1 flat, and was featureless for the week. Doctor-Jack Pot sagged off from 9½ to 9c., with no developments. Acacia lost from 8 to 7¼c. during the week, recovering to 7¾c., while Work wound up the day at 5⅞c., after selling at 6c. Golden Cycle sold at 68c., but was featureless outside of the payment of the dividend at the rate of 5c. a share. The balance of the market presented nothing new.

Salt Lake City. March 27.

(From Our Special Correspondent.)

The market for the week has been featureless. The general condition remains steady, with interest centered in Daly West, Daly-Judge, May Day, California, and a few lower-priced shares. The list, as a whole, has moved up a few points, while the volume of business transacted falls off a little as compared with last week. The heaviest traders are California, 19,200 shares, at 6½@5½c.; May Day, 86,120 shares, at 24@19c.; New York Bonanza, 12,700 shares, at 24¾@22½c.; Sacramento, 18,700 shares, at 27½@27c.; Star Consolidated, 12,150 shares, at 14¼@10c.; Silver Shield, 20,100 shares, at 8@7½c. Daly West records an advance to $42.70 high. Consolidated Mercur advanced a fraction to $1.60. The number of shares for the week was 245,020, which brought $183,926.

San Francisco. March 28.

(From Our Special Correspondent.)

The market was generally heavy, with a downward tendency. Sellers were more in evidence than buyers, though some support was given to the leading stocks.

Consolidated California & Virginia brought $2@$2.10; Ophir, $2@$2.10; Mexican, $1.35@$1.40; Sierra Nevada, 89@92c.; Hale & Norcross, 75@80c.; Crown Point, 35c.; Potosi, 34c.; Gould & Curry, 35@40c.

In oil stocks trading was rather narrow, and buyers seemed to be out of the market. Sterling sold at $3.10@$3.15; Home, $2.70@$2.75; Oil City, 32c.; Lion, 8c. Oil City was a special favorite in the trading.

COAL TRADE REVIEW.

New York, March 2.

ANTHRACITE.

As was predicted some weeks ago in this column the new spring prices show an advance of 50c. over last year. The advance, judging from newspaper comment, is not pleasing to the public, but the newspapers did not enlighten the public when the strike started last May—did not give that information about wages and the general condition of labor at the anthracite mines which any industrious, intelligent and unbiased reporter could have secured. As a result the public sympathized with the strikers, helped prolong the strike, and is now called on to pay the bill. Misdirected sympathy is often expensive.

Temperatures for March averaged the highest on record at New York, and in all anthracite burning territory the consumption of coal must have been far below the average. Following a mild February the month surprised many speculators, and caused them some loss.

The early opening of navigation means a heavy movement of coal this month to upper lake ports, where supplies are very low. The territory tributary to Lake Superior, however, did not suffer as much last winter from a shortage of coal as that along the Atlantic seaboard. In Chicago territory there has been for a couple of weeks, pending the announcement of new spring prices, practically no demand for anthracite. Arrivals of all-rail coal have been delayed by the congested condition of the railroads, and purchasers have been complaining loudly at the delay, and in some cases have taken the coal at a discount. The new price for April is $6 for egg, stove and chestnut sizes. Along the lower lakes and in Canadian territory spring business is opening briskly. A number of vessels are loaded with anthracite at Buffalo, and some should have started for upper lake ports before this. Along the Atlantic seaboard spring business promises to be very heavy, judging from the orders that sales agents are receiving. At New York the April prices for free-burning white ash are: Broken, $4.25; egg, stove and chestnut, $4.50, f. o. b. harbor loading port.

BITUMINOUS.

The Atlantic seaboard bituminous trade is quiet. The improvement in car supply last week, with accompanying prompt transportation, led to a small blockade, embargoes to certain mines followed, and are yet in force. Contracts for the new year are still being closed. Producers of the better grades have their output pretty well covered, and producers of the next lower grades will soon be getting their quota of contracts. There is a wide range in prices reported—from $1.75 to $2.10 at the mines—on new contracts. The labor situation shows no changes. Producers have named advances of from 15 to 20 per cent—making the pick mining rate in Maryland 65c., while the machine rate in the Clearfield region of Pennsylvania is as good. Producers generally refuse to recognize the union, and with the findings of the Anthracite Arbitration Commission to support their contentions, as to the general character of the United Mine Workers' organization, and membership, are not likely to yield easily.

Producers have practically cleaned up the balances due on old contracts, and shipments on new contracts have started. In some cases the old prices will prevail on boats in before April 1.

In the far East the trade still feels the effects of imports of foreign coal. Along Long Island Sound the trade is taking all the coal it can get. A shortage of cars and bad discharging facilities at New York, New Haven & Hartford docks have stopped outside purchases. At New York Harbor points trade is quiet. A considerable tonnage is arriving, but is promptly taken. Prices for ordinary grades of Clearfield, f. o. b., are $3@$3.10. The all-rail trade has been stocking up a little lately, and it is thought that most consumers have about reached the limit of their storage capacities.

Transportation from the mines to tidewater is excellent, coal running through on schedule. Car supply at the mines ranges around 35 per cent where embargoes are not enforced. In the coastwise vessel market, vessels are scarce, with freight rates firm and possibly advancing. We quote current rates from New York Harbor: Providence, New Bedford and Long Island Sound, 75c.; Boston, Salem and Portland, 85@90c. From Philadelphia rates are 85c. to Sound points and $1@$1.05 to Boston, Salem and Portland.

Birmingham. March 30.

(From Our Special Correspondent.)

The mines are enjoying healthy outputs in this State, and efforts are being made to increase capacities right along. The Galloway Coal and Coke Company expects to be getting 500 tons of coal daily from its Garnsey mines in Bibb County, after this month. These mines were opened several months ago, and have been working up to an increased output. The Galloway Company, during the year 1902, produced something like 400,000 tons of coal. The company has signed a scale with all of its miners in the Walker County coal-fields, Knights of Labor, granting them an advance of 5c., effective April 1.

As to new coal companies, it is announced that E. K. Rictmyer, originally from Youngstown, O., now connected with the Tennessee Coal, Iron and Railroad Company's steel plant at Ensley, is at the head of a company to develop about 1,600 acres of fine coal lands in Walker County along the 'Frisco System, 50 miles west of Birmingham. It is intended to open a new coal mine at once and build 200 coke ovens.

Coke is a little more plentiful in this State, and some of the companies are able to sell a small amount. Considerable coke is still being brought into the district. The Lacey-Buek Company is about to let the contract for the erection of 200 more coke ovens. The new ovens of the Sloss-Sheffield Steel and Iron Company will be ready for operation early in May, while the Alabama Steel and Wire Company will be able to start up the ovens at Virginia City, near Bessemer, about June.

Cleveland. March 31.

(From Our Special Correspondent.)

The first charters for the transportation of coal to the upper lake ports were made from this port during the past week. The Duluth rate has been established at 40c. for the first cargoes, with nothing said so far about the contracts which are pending for the remainder of the season. This has virtually fixed the rates also to Milwaukee at 50c., which is about the opening scale of a year ago. There is some contention over the Portage Lake rate, and it is possible that a change will be made. The first charters were at 45c., but this is a little above what the market generally looked for, and will hardly be decisive. The coal-loading machinery all along the lake has been started during the past week, and the loading of coal has been quite general. In fact, the beginning is indicative of what the shipment during the season is to be. The coal shippers are to hold a meeting the latter part of this week on the subject of coal prices for the present season. The domestic dealers are waiting before making future contracts, until these prices have been announced. It is understood, of course, that considerable advances will be made, but just what they will be it would be hard to say. The domestic supply of fuel is much improved, and the mills and factories are having less difficulty in getting fuel, although their trouble has not disappeared altogether.

Pittsburg. March 31.

(From Our Special Correspondent.)

Coal.—All the coal mines in the Pittsburg District and all over the country where the United Mine Workers has an organization will be closed to-morrow. The fifth anniversary of the establishment of the eight-hour workday will be appropriately celebrated. Mass meetings will be held throughout the district. The new mining rate will become effective to-morrow. It is expected that the railroads will be able to move loaded cars and bring in empties while the mines are idle, and that all will be in full operation on April 2. There is an unusually heavy demand for coal, but operators are not accepting new business for extended future delivery, as it now seems certain that higher prices will rule before the end of the year. According to inquiries from the Northwest it is estimated that the demand this year will be fully 1,000,000 tons greater than last year.

Connellsville Coke.—Production and shipments continue to increase, and high figures may again be reached unless interfered with by poor transportation facilities. There is a slightly improved car service, and the stocks in the yards are being reduced. The opening of the Lake shipping season may take a number of cars out of the coke trade. Furnace coke for shipment on contracts is quoted at $4. The *Courier*, in its last weekly report, gives the production for the previous week at 247,000 tons. The shipments aggregated 11,725 cars, distributed as follows: To Pittsburg and river tipples, 3,592 cars; to points west of Pittsburg, 6,190 cars; to points east of Connellsville, 1,920 cars. This was an increase of 122 cars.

San Francisco. March 28.

(From Our Special Correspondent.)

The coal market continues quiet and unchanged. Stocks are generally good, with the exception of Eastern coals.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington, $8.50; Southfield, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations continue at $14 for Pennsylvania anthracite and $12 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $6.50.

Foreign Coal Trade. April 2.

Exports of coal and coke from the United States for the two months ending February 28, are reported by the Bureau of Statistics of the Treasury Department as follows:

	1902.	1903.	Changes.
Anthracite	215,465	310,266	I. 94,801
Bituminous	750,337	732,668	D. 17,669
Total coal	965,802	1,042,934	I. 77,132
Coke	68,626	48,965	D. 19,661
Total	1,034,428	1,091,899	I. 57,471

The coke exports were chiefly to Mexico. The distribution of the coal exported was as follows:

	1902.	1903.	Changes.
Canada	623,209	809,777	I. 186,568
Mexico	84,106	75,733	D. 8,373
Cuba	71,826	76,913	I. 5,087
West Indies	76,369	47,209	D. 29,160
European countries	55,437	2,218	D. 53,219
Other countries	55,055	31,084	D. 20,971
Total	965,802	1,042,934	I. 77,132

The changes this year were due chiefly to our own shortage, which left little surplus for foreign trade.

Imports of coal into the United States for the two months ending February 28 are reported as follows:

	1902.	1903.	Changes.
Canada	254,420	356,976	I. 102,556
Mexico	1,358	5	D. 1,353
Great Britain	27,348	797,517	I. 770,169
Other Europe	590	300	D. 290
Japan	40	.....	D. 40
Australia	64,165	29,015	D. 35,150
Other countries	127	1,005	I. 878
Total	348,048	1,184,818	I. 836,770

Of the coal imported from Great Britain this year 148,924 tons were classed as anthracite. All the rest of the coal imported was bituminous. The increase in imports this year was wholly at Atlantic ports.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of March 21, that prices remain unaltered, but the general tone of the Welsh coal market continues better. Tonnage has arrived on dock more plentifully and stems are getting well filled. Quotations are: Best Welsh steam coal, $3.42@$3.48; seconds, $3.36; thirds, $3.30; dry coals, $3.24; best Monmouthshire semi-bituminous, $3.12@$3.18; seconds, $3.06; best small steam coal, $2.16; seconds, $2.04; other sorts, $1.80.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The general tone of the freight market is unaltered. Rates continue firm and tonnage is rather scarce. Some rates from Cardiff are: Marseilles, $1.65; Genoa, $1.62; Naples, $1.62; Las Palmas, $1.56; St. Vincent, $1.74; Rio Janeiro, $2.52; Santos, $2.88; Buenos Aires, $2.16.

IRON TRADE REVIEW.

New York, April 1.

The iron market continues generally strong, especially so far as finished material is concerned. Plates and bars remain in demand, and sheets are stronger than for some time past. The demand for structural steel, however, has fallen off a little, chiefly on account of the strike among the bridge and structural iron workers and the anticipation that this movement may spread.

In pig iron a good deal of business has been done, chiefly in foundry and forge iron. Bessemer has not been sold heavily, principally on account of the delay on the part of the United States Steel Corporation in placing outside orders. It is probable that this delay is due to the fact that the Corporation is waiting the result of other negotiations.

Production is somewhat better, especially in the Pittsburg District and the Mahoning and Shenango valleys. The blast-furnaces now are generally receiving a fair supply of coke, although some outside furnaces are paying premiums. It is feared, however, that the opening of the Lake trade will take a number of cars out of the coke region, and that further delays will result.

While no announcement has yet been made as to the deal for the purchase of the Jones & Laughlin Steel Company by the United States Steel Corporation, indications are that it has been practically completed. The same may be said of the Shenango blast-furnace plant. As to the Clairton plant, there seems to be a delay which is probably due to the reluctance of the Crucible Steel Company of America to part with its only new and modern furnace.

Birmingham. March 30.

(From Our Special Correspondent.)

Shipments from this section of the country are steady, the weekly movements being heavy. The shipments equal the production. The production, on the other hand, is holding up well. During the coming fortnight or so a couple of furnaces in this district will be blown out for repairs. There will be two others, however, to go in blast, so that there will be no change in the production.

Quotations are holding strong. Some of the non-Association furnaces in this district are inclined to sell iron at a little below the agreed prices, but very little of the iron is being sold. The price of $18.50 per ton for No. 2 foundry is being strictly maintained, and it is asserted that even this price is being bettered. Sales have not been as numerous as has been stated, because of the waiting game, but small lots aggregate fairly well, and there is no accumulation, nor any in prospect. The following prices are given: No. 1 foundry, $19@$20; No. 2 foundry, $18.50@$19.50; No. 3 foundry, $17.50@$18.50; No. 4 foundry, $17.50@$18; gray forge, $16.75@$17.50; No. 1 soft, $19@$20; No. 2 soft, $18.50@$19.

There is steady work at the rolling mills in this district, except in one or two departments at the Birmingham rolling mills. There is a good demand for finished iron and steel. The mill workers have elected their delegates to the annual convention of the Amalgamated Association of Iron, Steel and Tin Workers to be held in Ohio. The Anniston rolling mills and the rolling mill department of the Alabama Tube and Iron Company's plant at Helena are still idle, though rumors have it that both are to resume work in the near future.

At the steel plant at Ensley four of the ten open-hearth furnaces are being repaired. The other six are doing well. The plant of the Alabama Steel and Wire Company at Ensley is doing well.

The foundrymen of this district make good reports as to work while the machine shops are busy.

Rumors prevail again that the Woodward Iron Company will shortly begin the erection of a third furnace. Definite announcement will be made upon the return from California of President J. H. Woodward.

There is a rumor that representatives of the United States Steel Corporation have been in the Birmingham District making efforts to purchase ore lands hereabouts. Three of the directors in the Steel Corporation are said to be big holders of stock in the Sheffield Furnace and Mining Company, which is operating three furnaces purchased from the Tennessee Coal, Iron and Railroad Company. This company has purchased ore lands in this State and in Tennessee near the Alabama line.

Cleveland. March 31.

(From Our Special Correspondent.)

Iron Ore.—Contrary to expectations, nothing has been done so far in the way of fixing the prices at which ore is to be carried down the lakes this summer. There is a hesitancy which is not easy to explain, unless it be on the ground that the shippers and the vessel men understand the contest that is ahead and shrink from entering it. There can be little doubt that the biggest battle in years is immediately ahead of these interests. The vessel men are fighting for 90c. between Duluth and Ohio ports, and the owners for 85c. between the same ports. The price of ore having been fixed, most of the sales have been made for the year, the tonnage reaching a large aggregate. The prices are still as they were, being based on a quotation of $4.50 for bessemer old range and $4 bessemer Mesaba.

Pig Iron.—The buying of foundry is fairly heavy for the last half, with nothing especially attractive in the situation at present. The contracts for second half, while lively, have not been up to expectations, and yet the furnace men are not complaining in the least, taking some satisfaction out of the delays that are now being encountered, as they are given time to catch up a little. The spot buying is about all that the furnaces can take care of. Prices have not changed from $22 for first half delivery, Southern Ohio furnace, and $21@$21.50 for second half, Valley furnace. Basic is being sold in small quantities for second half delivery, but with the market affording no material for spot shipment. The prices have remained at $21.50@$22 for first half, Valley furnace, and $20 for second half, Valley furnace. Bessemer transactions are light, with nominal quotations as follows: $21.50 for first half and $20.50 to $21 for second half.

Finished Material.—The market for finished steel was easier during the week. New orders came in slowly, and the principal activity was along the line of specifications on old contracts which were heavy. Sheets seemed to be the one thing which departed most widely from this general assertion, but even this trade did not display that activity which it might. However, the market is firm and on the up grade. The prices, however, remain as they were, being 3.10@3.25c. for No. 27 black sheets out of stock, that being the base quotation. The bar iron market is stable, but without any great activity. Most of the consumers have covered the major portion of their needs for the present, and most of the producers have all of the material they care to produce. The quotation is still 1.85c., Youngstown. The jobbers are getting 2c. out of stock. Bar steel is in better demand, with frequent rumors of advances in sight after the meeting shall have been held next week. The present quotation is 1.60c., Pittsburg, for bessemer, with the usual difference for open-hearth. Plates have been firm and steady, with good specifications on old contracts, but with nothing inviting in the way of new business. The smaller mills are not getting quite the amount of business they might have wished, and are not quite so strong on their quotations of prices, although they are still holding to 2c. at the mills. Structural seems to be a little stronger than it was, and some of the smaller mills are getting a little premium business, but the larger mills are so well up with their contracts that they are not having any difficulty in meeting demands for good-sized orders in 30 or 60 days. The jobbers are still getting a good deal of business at 2.25c. The rail trade during the past week has been light, with no change in the prices whatever, the market being firm at $28 The sales have been in small lots.

Philadelphia. April 1.

(From Our Special Correspondent.)

Pig Iron.—We are meeting this week with two classes of buyers—those who are wanting to purchase for delivery this quarter, and those who are thinking about buying for delivery during the last half of the year. Thus far, neither class has done much business. The small buyers are looking over the market, and apparently are endeavoring to post themselves as fully as possible in regard to the situation. Agents and brokers are quoting prices, which are without any sign of concession, but are not making any effort to secure business. From their point of view the surplus production for the next few months will be absorbed without the least difficulty. Those who make the better grades of iron, while quoting prices to the average inquirer as a matter of courtesy, are doing so knowing that they really have no iron to spare after their promises to their regular customers are filled. A great deal of the good iron made in Eastern Pennsylvania is practically contracted for in this way, though prices have not been definitely fixed. Certain consumers are in the habit of buying their iron from certain makers, and their wants are always kept in mind. It is for this reason that these makers particularly, show no desire to take on new customers. Inquiries have begun to arrive from a number of mill companies, and the indications to-day are that considerable iron will be under contract by Saturday. Forge is strong, and consumers are rather inclined to arrange for delivery during the latter part of the year, but they are not jumping at opportunities. Foundry iron continues very strong, and No. 2 is under better inquiry than No. 1. Basic and bessemer continue strong, which is traceable to heavy dealings in Western markets. Quotations remain as they have been for several weeks past, and fluctuations are not probable.

Billets.—The demand for billets appears to be dull if measured by sales. Latest quotations show an advancing tendency, where small quantities are the subject of inquiry. Further dependence is likely to be had on foreign sources of supply.

Merchant Bar.—Our bar mills all through eastern and middle Pennsylvania are feeling the effects of the spring demand. The week's business since last report is made up of a multitude of rather small orders, nearly all for refined iron and steel bars. As the business is small, strong prices have been named.

Sheets.—We have done more business in galvanized, some of the orders being exceptionally large. The manufacturers of sheet iron are holding their own, and are resisting the efforts of the large consumers to name easier terms for postponed deliveries.

Boiler Tubes.—The market for tubes developed unexpected strength this week. The activity is due to quite a number of the smaller shops appearing in the market. Boiler tube work is very urgent. Deliveries are not in all cases as prompt as they ought to be.

Pipe.—This has been a very good week in pipe as to inquiries, though up to present writing our representatives have not much business to report as closed.

Merchant Steel.—The developments of the past few days do not possess special significance. Steel capacity will be kept in a strained condition. Prices are strong.

Plates.—The market was taken by surprise over the shading of prices which was forced on them by Western plate makers. Our people say the cut is without excuse, and will do no good. The effect is already seen in the withholding of some orders that we were to have secured this week. What the Western people mean by this course at this time is not altogether clear.

Structural Material.—The structural material situation has not weakened as yet, and our people do not admit that shapes will suffer with plates.

Steel Rails.—Steel rails are quoted at $28 for standard sections, and $33@$35 for girders; there have been further developments in the girder branch looking to the placing of more business.

Old Rails.—Agents for consumers expect to close negotiations very soon for several lots of old iron rails. There is no change in quotations.

Scrap.—The scrap market appears, at least on the surface, to be quiet, and the only business to be reported is in the lower grades, and it is not very much.

Pittsburg. March 31.

(From Our Special Correspondent.)

The iron and steel market is quiet this week as to sales, but prices in all lines continue firm. All the blast furnaces in the Pittsburg District and in the Valleys are in operation, and have a full supply of coke, although in some instances it is necessary to pay a premium to get prompt delivery. These conditions are not expected to continue long, as the Lake season soon will open, and many railroad cars will be taken out of the coke trade for coal and other lake freight. Furnace owners are well sold up, and are not anxious to take on any new business with transportation facilities so uncertain. It is impossible to place a contract for bessemer pig iron for this year's delivery at less than $20, Valley furnace, and it is doubtful if that price can be done even on a large and desirable order. Some small sales have been made during the week of all grades of pig iron, and the prices were a shade higher than have been quoted. The expected order for 140,000 tons of bessemer iron from the United States Steel Corporation is for some reason still tied up. It has been reported that the Corporation is not now in the market for pig iron, but, if true, would indicate that the deal for the Clairton and Shenango blast furnaces had been closed, but there are no grounds for such a conclusion. The prospects for this deal going through do not seem to be as favorable as last week.

The only feature in the market in the finished lines is the advance in the price of cut nails of 5c. a keg, and an increase of 10c. a square on painted and 20c. a square on galvanized corrugated roofing sheets. The advance in cut nails is the second made this year, and the price is now 10c. a keg higher than on January 1. The lowest quotations on nails at Pittsburg now are as follows: Steel cut nails, $2.15; iron cut nails, $2.25; wire nails, $2. New business in steel plates has increased to such an extent that mills are forced to refuse orders. Small lots for delivery, before July 1, are taken by some interests at premiums ranging from $4 to $6 a ton. There is a lull in the bar iron market, but the sales made during the past four weeks have been unprecedented, and the mills are sold up for months ahead. In steel bars the number of inquiries is increasing. Agricultural implement makers will begin soon making contracts for the season. There will be no change from the price established by the steel bar pool. Prices are higher this week on crude steel and bessemer and open-hearth billets are extremely scarce.

The remodeled sheet plant at Canonsburg, a few miles from Pittsburg, is scheduled to start to-morrow, but this will not be possible, as the Amalgamated Association of Iron, Steel and Tin Workers yesterday declared a strike and all union men are ordered to stay away. The plant that it is proposed to operate was owned by the Canonsburg Iron and Steel Company, and was sold to the American Tin Plate Company in 1899, but was not operated. Last July a company was formed with John F. Budke at the head, known as the Canonsburg Steel and Iron Works, and the dismantled plant was purchased, the price being $125,000. It was stipulated in the sale that the works were not to be put in operation for six months. The new company rebuilt the plant, but did not start on February 1, as at first intended, owing to the demoralized condition of the sheet industry. Prices are firmer now, and despite the high price of steel it was believed the plant could be operated if the skilled workmen would agree to take a reduction in wages of from 15 to 20 per cent. Several conferences were held, but the officers of the Amalgamated Association refused to permit the members of the organization to make the desired concessions. When it was reported that the company had applications from a sufficient number of non-union men to start the works the strike was declared. There are a number of independent sheet mills that have no steel supply of their own that are unable to operate, owing to the high wages and high price of steel.

Contrary to expectations no official announcement has been made of the proposed taking over by the United States Steel Corporation of the Clairton Steel Company, Shenango Furnace Company and the Jones & Laughlin Steel Company. In some quarters it is believed that the deals may yet fall through. A meeting of the board of directors of the Crucible Steel Company of America, of which the Clairton Com-

pany is a subsidiary interest, was held last Thursday. It continued until late in the evening, and at the close information as to what had been done was refused. It is understood that prominent stockholders objected to the price named as being entirely too low. President Charles M. Schwab made a second visit to the city, spending three days here, and leaving for New York yesterday. It was believed the object of this visit was to close the pending deals, but he evidently did no business, as he remained at home most of the time.

An effort is now being made by the International Association of Bridge and Structural Iron Workers to end the strike against the American Bridge Company. A general conference has been asked. While the request was refused the company is willing to hold local conferences, but so far the men have not accepted the offer. The company continues to bring in new men, and the strikers induce as many as possible to refuse to work. To-day the company has about 100 new men ready to go to work on the Wabash bridge. Fully 300 have been brought here from other cities.

Pig Iron.—A few sales of bessemer and foundry iron have been made at the highest prices of the year. Bessemer is held at $21, Valley, for delivery before July 1; $20.50 for third quarter, and $20.25 for deliveries covering the last half. Basic iron is quoted at the same price as bessemer. For early delivery foundry No. 2 is selling at $22.50, Pittsburg, and there has been no sales for extended future delivery. Gray forge for early shipment is quoted at $21@$21.50, Pittsburg.

Steel.—Bessemer steel billets are higher this week, being quoted at $31.50, Pittsburg, and open-hearth billets are $32@$33. While premiums of from $4 to $6 a ton are paid for steel plates for prompt shipment, the official price remains at $1.60c. Steel bars are quoted at the same figure, and some heavy sales are expected within the coming month.

Sheets.—The sheet market is strong, but No. 28 gauge black sheets continue at 2.75c., and it is not likely that an advance will be ordered, although it was expected that the price of black sheets would be higher after April 1. No. 28 gauge galvanized sheets are firm at 3.85c. Corrugated roofing has advanced 10c. a square on painted and 20c. a square on galvanized. Painted roofing from No. 28 gauge black sheets, 2½-in. corrugation, is now $2 a square of 100 sq. ft., and galvanized is $3.50.

Ferro-manganese.—Domestic 80 per cent is still out of the market, and the foreign product is quoted at $50@$52.50.

New York. March 2.

Pig Iron.—The market is more active, with some large sales noted. We continue to quote for early delivery, Northern irons at tidewater: No. 1X foundry, $23.25@$23.75; No. 2X, $22.25@$22.75; No. 2 plain, $21.25@$21.75. For Southern iron on dock, New York: No. 1 foundry, $22.25; No. 2, $21.75; No. 3, $21.

***Bar Iron and Steel.*—We** quote for large lots on dock: Refined bars, 1.95@2c.; soft steel bars, 1.80@1.90c.

Plates.—Eastern mills are preparing to meet prices made by Pittsburg mills, and quotations are lower. Tank, ¼-in. and heavier, 85@90c.; flange, 1.90@95c.; marine, 2.05c.

Steel Rails.—The quotation remains $28 for standard sections, f. o. b. mills for 1903 delivery; light rails, $32@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Structural Material.—In spite of the threatened strike of iron workers in the building trades, demand remains pretty strong. We qrote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c.

Cartagena, Spain. March 14.

(Special Report of Barrington & Holt.)

Since our last report two cargoes of manganiferous ore, 5,950 tons, have been shipped to British ports. There is little new to mention in the local mineral market during the week; the demand is steady and prices generally maintained. Freights are somewhat higher specially for Maryport where slow dispatch is making owners careful in accepting low freights for that destination.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton. No shipments are reported for the week.

CHEMICALS AND MINERALS.

(See also prices-current on page 548.)

New York, April 2.

Contrary to late experience, manufactured products are firmer and advancing, while the more important raw materials, such as brimstone and nitrate of soda, have weakened in price. Explanation of this situation may be found in the heavy imports and expected early arrivals, which have created stocks in dealers' hands that are of sufficient weight to cause a reaction in market prices. Of course, this is only temporary, as the respective combinations will no doubt initiate a change by strengthening the primary markets.

On April 1 the Chilean nitrate of soda producers entered into the third year of their combination agreement. This compact is good until April, 1905, as it was originally agreed to last for five years. The combination has worked satisfactorily as far as the profits of the ofincias are concerned, but consumers have had to pay.

The asphalt combinations are in a bad way. Supplementing the information given elsewhere it is learned that the securities, consisting of stocks and bonds in 16 subsidiary concerns, aggregating $6,000,000, will be marketed to meet the interest of $2,423,075 on the combinations' $36,000,000 bonds, which are held as collateral by the Land Title and Trust Company. Among the securities to be sold are 38,993 shares (par $100) of the Barber Asphalt Company, of West Virginia, which represent a 999-year concession on the asphalt lake on the island of Trinidad. It is also understood that a reorganization plan is on foot, but it will not succeed, unless the capitalization of the combination is greatly reduced. The consumption of asphalt imported into the United States in the two months ending February 28, compares with last year as follows, in long tons:

	1902.	1903.	Changes.
Imports	14,443	11,367	D. 3,076
Re-exports	82	402	I. 320
For consumption	14,361	10,965	D. 3,396

The decrease of 21 per cent in imports this year has been due partly to the Venezuelan diplomatic troubles which have interfered with exports to America.

The consumption of imported heavy chemicals in the United States in the two months ending February 28 is given below, in pounds. Figures for bleaching powder will be found in the regular weekly market report.

	Imports.	Re-ex.	Consump.
Chlorate of potash	59,000	5,605	53,395
Caustic soda	551,989	249,334	302,655
Sal soda	550,383	.....	550,383
Soda ash	4,924,795	26,706	4,898,089

Compared with the corresponding two months last year the decreases are 108,871 lbs., or 67 per cent, in chlorate of potash; 324,472 lbs., or 52 per cent, in caustic soda; 107,677 lbs., or 16 per cent, in sal soda, and 490,562 lbs., or 9 per cent, in soda ash. The bulk of these imports was from Great Britain, although Germany, Belgium and France also contributed quantities of chlorate of potash. The falling off in imports emphasizes the growth of the American industry.

Bleaching Powder and Chlorine.—Demand is of a retail character only, and prices are unchanged, as follows: Domestic bleach, $1@$1.12½ per 100 lbs., f. o. b. works; foreign, $1.20@$1.25, f. o. b. New York, for future shipments, and $1.37½@$1.62½ for early deliveries. Liquid chlorine, imported from Germany, is held at 30c. per lb., f. o. b. New York, and chlorine water, 10c.

Imports and re-exports of bleaching powder into the United States in February and the two months of this and last year, were as follows, in pounds:

	February.	1903	1902.
Imports	10,675,701	18,299,434	21,069,347
Re-exports	66,960	66,960	112,471
For consumption	10,608,741	18,232,474	20,956,876
Gt. Britain exports to U. S.	8,931,664	15,901,760	14,858,592

The falling off in the consumption of foreign bleach this year is equal to 2,724,402 lbs., or about 13 per cent, owing partly to an increased domestic production. The invoice value of imports this year averaged 98c. per 100 lbs., which compares with $1.35 last year; showing a drop of 37c. in 1903. Deducting 2c. per 100 lbs. duty, and an additional amount for other expenses, it will be seen that profits are small, as a result of the keen competition following the dissolution of the European trade agreement last year.

Cyanide of Potassium.—Imports at Atlantic ports in March were approximately 239,104 lbs., making a total of 709,112 lbs. for the 3 months this year. Of this total Germany furnished 375,352 lbs., and Great Britain 333,760 lbs. There is a duty of 12½ per cent ad valorem, which on the United States imports of 3,054,254 lbs. in the fiscal year ended June 30, 1902, amounted to $74,448.38, while the average value of the cyanide was 19½c. per lb. Present quotations are 20@20½c. per lb., f. o. b. New York.

Acids.—Trade is seasonably good, and prices steady. Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic com'l...	$5.25@$5.50
Muriatic, 20°..	1.60	Sulphuric, 50°,	
Muriatic, 22°.	1.75	bulk, ton....	13.50@14.50
Nitric, 36°....	4.37½	Sulphuric, 60°.	1.05
Nitric, 38°....	4.75	Sulphuric, 60°,	
Nitric, 40°....	5.00	bulk, ton	18.00@20.00
Nitric, 42°....	5.37½	Sulphuric, 66°,	1.20
		bulk, ton	21.00@23.00

Copper Sulphate.—Evidently the curtailed domestic supply, owing to the limited production and increasing demand, has opened the way for speculation. Makers who have a little to sell are asking $5.50 per 100 lbs., f. o. b. New York, but second-hands, who contracted at the late low prices, are willing to shade this quotation. On the other hand, imports from Great Britain have been made at something less than $4.50. Exports are declining, and to-day are only a little over one-quarter the size reported by our British cousins. In fact, the United States exports in the two months ending February 28 amounted to only 6,718,033 lbs., which is 1,859,171 lbs., or 21.7 per cent less than for the corresponding period last year. Our leading customers, Austria and Italy, are now apparently buying more from Great Britain, as the decreased exports from America would indicate. Certainly our trade abroad is not as remunerative as that being done by Great Britain. The average invoice value of our exports this year is only $3.65 per 100 lbs., as against $4.09 on British trade. In both cases prices are less than those quoted in America on domestic business.

Brimstone.—The increased imports this year have caused a weakness in prices below any that have been quoted in a long while. In fact, best unmixed seconds are obtainable on spot at $21.50@$21.75 per ton, which were the quotations at one time for best thirds. Future shipments of best unmixed seconds ore worth $22@$22.25. Best thirds are nominally 75c.@$1 per ton less than seconds, but business in this quality is limited by the lower cost of the sulphur obtained from pyrites. The imports of brimstone into the United States in February amounted to 9,031 long tons, making a total of 34,958 tons for the two months this year, and showing an increase of 8,020 tons over 1902.

Pyrites.—Arrivals are more frequent, and this week 3,400 tons iron pyrites and 3,444 tons cupriferous ore were reported at New York from Spain. Ocean freight rates are nominally unchanged at 11s.@11s. 6d. ($2.64@$2.76) from Huelva, Spain, to Atlantic ports. Trade continues good, as the fertilizer consuming season is here.

Imports of pyrites into the United States in February and the two months of this and last year were as follows, in long tons:

		Two months.	
	February.	1903.	1902.
Imports	38,860	68,474	58,747
Sulphur content	18,264	32,183	27,611

The imports were principally from Spain, and were mostly iron pyrites. The increase of 9,727 tons this year shows the heavy demand in the fertilizer industry. The average value of the imports this year was $3.52 per ton, which compares with $3.38 last year; showing an increase of 14c.

We quote for domestic pyrites, $5 per ton for lump ore, f. o. b. mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 12@13c. per unit for lump, and 10@11c. for fines, delivered at New York and other Atlantic ports.

Nitrate of Soda.—The market is easier, and spot can now be bought at $2.10 per 100 lbs., while futures range from $1.87½ to $2, according to position.

Imports and re-exports of nitrate of soda in the United States in February and the two months of this and last year were as follows, in long tons:

		Two months.	
	February.	1903.	1902.
Imports	18,149	35,238	24,840
Re-exports	.....	204	1,008
Balance	18,149	35,034	23,832

Apparently the domestic consumption has increased 11,182 tons, or over 47 per cent, this year. Undoubtedly the demand has been heavy from powder manufacturers supplying the coal mines, and the fertilizer trade has also been a large buyer, as the Atlantic deliveries have increased fully 66 per cent this year.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write us as follows, under date of February 20: The market opened quietly, with some small transactions at 6s. 3½d. for March 95 per cent, and at 6s. 3¼d. alongside, for strings from July to December delivery, but soon became flat on the basis of 6s. 2½d. alongside for March—April, and 6s. 3d. for June—August, several parcels changing hands. The demand, combined with the news that the deliveries in Europe during the first fort-

night of February had been larger than last year, caused sellers to retire or ask higher prices, which have not been followed on the part of buyers. In the refined article small sales have been made at 6s. 6½d. @6s. 7½d. alongside for prompt, 6s. 6d.@6s. 6½d. for April, and 6s. 5½d. for August—December. The exports during January amounted to 2,920,000 qtls., against 1,840,000 qtls. last year. The production was 2,605,000 qtls., against 2,283,000, and the consumption of the world, 1,980,000 qtls., against 1,999,000 qtls. We quote, 95 per cent, February—March, 6s. 3d., April—June; 6s. 2½d., July—December; 6s. 3½d., and 96 per cent prompt, 6s. 7d.; all ordinary terms, sellers. The price of 6s. 3d. per quintal, with an all-round freight of 12s. 6d. per ton, stands in 7s. 7d. per cwt., net cost and freight, without purchasing commission. Reported sales are 811,000 qtls., and re-sales, 209,000 qtls.

Sulphate of Ammonia.—Demand is good, and prices are higher. Gas liquor is quoted at $3.15@$3.20 per 100 lbs. for early shipment, while futures are up to $3.30. Speculators are undoubtedly again in control of the market, as they have been encouraged by the heavy production last year, which was the high record. It is estimated that Great Britain produced 221,500 long tons in 1902, of which the gas works contributed 146,300 tons, or 66 per cent, the balance coming from shale and iron works, and by product coke ovens.

Phosphates.—There are evidences that the trade will realize better prices this year than last, as miners refuse to extend old contracts owing to the small profits accruing therefrom. Inquiries from European superphosphate manufacturers are many, and some orders at higher prices are being taken, but the exports so far this year show a considerable decrease as compared with last year. Ocean freight rates are somewhat easier. Charters from Florida hard rock ports to the Baltic are being booked around 14s. 6d. ($3.48) per ton, which makes the f. o. b. prices more satisfactory to exporters. Peace River phosphates are still quoted abroad, although it is known that the American Agricultural Chemical Company, the Northern fertilizer combination, has obtained control of 12,475 shares of the 12,500 capital stock (par $100) of the Peace River Phosphate Mining Company for the purpose of securing a regular supply of raw material. It is believed, however, that the fertilizer company will not consume all of the 150,000 tons of river pebble, which can be produced, and that a quantity of it will be shipped elsewhere.

The United States exports of domestic phosphates and imports of foreign, in February, and the two months of this and last year, are given below, in long tons:

	February.	Two months. 1903.	1902.
Exports	33,475	48,790	79,459
Imports	9,298	33,650	23,033
Excess, exports	24,177	15,140	56,426

The exports show a decrease this year of 30,669 tons, or nearly 39 per cent, owing chiefly to the smaller demand for high-grade Florida rock in Germany. Imports show an increase of 10,617 tons, or 46 per cent, which is credited principally to the low-grade Belgian phosphates.

Reports from foreign phosphate producing districts give the shipments from Bone, Algeria, in February at 23,736 tons, making 42,188 tons for the first two months this year. Of these exports the Constantine Company reported the largest quantity. Ocean freights from Bone to European ports are now from 6s. 6d.@7c. ($1.56@$1.68), which are much less than American exporters have to pay.

In the Pacific, the Christmas, Ocean and Pleasant Islands, show active development by British capitalists. Ocean Island, where work was begun in 1900, shows shipments for 1901 and 1902 of 40,000 tons, principally to Australia and Japan, and recently a cargo of 5,200 tons was sent to Stettin, Germany. It is authoritatively estimated that there are 12,800,000 tons of phosphate in sight on this island, while on Pleasant Island the quantity is given as 41,000,000 tons, making together 53,800,000 tons, which are under the control of the Pacific Islands Company, of London, England. The Ocean Island phosphates show analyses of 82.52 up to 88.69 per cent tribasic phosphate of lime, and from 1.5 to 0.52 per cent iron and alumina. Shipments are made with the guarantee that the phosphate shall contain less than 1.5 per cent iron and alumina.

Phosphates	Per ton F. o. b. *	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)	$6.50@$7.00	6⅜@7d.	$10.07@11.06
*Fla. land peb. (68@73%)	3.00@ 3.25	5½@5¾d.	7.70@ 8.05
†Tenn., (78@82%) export	3.75@ 4.00	6¼@6¾d.	10.00@10.80
†Tenn., 78% domestic	3.25@ 3.50	.....	.....
†Tenn., 75% domestic	3.00@ 3.25	.....	.....
†Tenn., 73@74% domestic	2.50@ 275	.....	.....
†Tenn., 70@72% domestic	2.25@ 2.50	.....	.....
‡So. Car. land rock	....@ 3.25	.....	.....
‡S. Car. riv. r'k (55@60%)	2.75@ 3.00	4⅝@5¼d.	5.61@ 6.04
Algerian (63@68%)	....	5¼@5¾d.	6.83@ 7.48
Algerian (58@63%)	....	5@5⅝d.	6.00@ 6.75

* Fernandina, Tampa, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. March 18.

(*Special Report of Joseph P. Brunner & Co.*)

The market for heavy chemicals is steady, but without any special feature of interest.

Soda Ash.—For tierces, the nearest range may be called about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s, per ton, net cash. Bags, 5s. per ton under price for tierces.

Soda Crystals are in good jobbing demand at generally £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for a few favored markets.

Caustic Soda is very firm, and makers are well supplied with orders. We quote: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 75 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching Powder is very slow outside of deliveries on contracts, and prices are nominal at about £4@£4 5s. per ton for hardwood packages.

Chlorate of Potash is quoted at 2⅞@3d. per lb., net cash, but there is little doing.

Bicarb. Soda is selling at £6 15s. per ton, less 2½ per cent, for the finest quality in 1-cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of Ammonia is strong and dearer at £13 5s.@£13 7s. 6d. per ton, less 2½ per cent for nearest spot for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda is moving off to a fair extent at £9 10s.@£9 12s. 6d. per ton, less 2½ per cent for double bags, f. o. b. here, as to quality.

METAL MARKET.

New York, April 2.

Gold and Silver Exports and Imports.

At all United States Ports in February and Year.

Metal	February. 1902.	February. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$8,665,480	$1,506,370	$10,639,155	$1,583,513
Imports	1,696,967	1,771,758	3,102,754	3,559,605
Excess.	E. $6,968,513	I. $265,388	E. $7,536,401	I. $1,976,
Silver:				
Exports	$3,926,585	$3,806,514	$8,459,595	$7,443,930
Imports	2,005,643	1,687,000	4,113,324	3,580,972
Excess.	E. $1,920,942	E. $2,179,506	E. $4,337,271	E. $3,862,95

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending April 1, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports	Total Excess. Exports or Imports.
Week	$2,200	$406,026	$346 954	$4,743	I. $61.615
1903	1,291,151	2,500,879	5,314,800	336,197	E. 3,768,875
1902	13,851,695	846,541	9,488,299	353 436	E. 22,140,017
1901	10,808,303	813,246	9,862,704	1,081,294	E. 18,776,467

Financial Notes of the Week.

General business continues unchanged, with activity reported from almost all quarters, notwithstanding rumors of labor troubles in some quarters. Speculation in stocks is somewhat discouraged by scarcity of money for stock exchange purposes; but business men are paying comparatively little attention to Wall Street just now.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending March 28, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$916,889,900	$904,074,500	$904,599,200
Deposits	1,004,283,200	965,353,300	894,260,000
Circulation	31,635,000	31,423,100	42,900,800
Specie	186,570,800	177,382,700	163,461,500
Legal tenders	73,370,500	70,921,200	66,384,400
Total reserve	$259,941,300	$248,303,900	$229,845,900
Legal requirements	251,070,800	241,338,325	223,565,000
Balance surplus	$7,870,500	$6,965,575	$6,280,900

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$177,382,700	.....	$163,461,500	.....
England	180,513,865	.....	188,411,825	.....
France	511,014,300	$221,417,495	505,244,360	$219,932,140
Germany	195,765,000	72,405,000	173,475,000	60,965,000
Spain	70,335,000	90,645,000	72,260,000	100,465,000
Neth'l'ds	25,430,500	32,995,000	20,537,000	32,935,000
Belgium	15,716,665	7,858,335	15,986,665	7,993,335
Italy	80,375,000	10,640,000	87,795,000	11,366,500
Russia	364,250,000	39,950,000	398,445,000	42,445,000

The returns of the Associated Banks of New York are of date March 28, and the others March 26, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market is steady to firm, owing to the purchases of the Government on Philippine coinage account. These purchases are likely to continue at rate of 500,000 oz. per week for the next 10 months. The probability is this absorption of so large an amount will cause higher London prices, consequently the immediate outlook of silver may be regarded as more cheerful.

The United States Assay Office in New York reports receipts of 53,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to March 19 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes..	
India	£1,712,585	£1,767,700	I.	£55,115
China	16,500	106,500	I.	90,000
The Straits	250	128,491	I.	128,241
Total	£1,729,335	£2,002,691	I.	£273,356

Receipts for the week, this year, were £266,000 in bar silver from New York, £3,000 from the West Indies, and £3,000 from Australia; total, £272,000. Shipments were £98,800 in bar silver to Bombay.

Indian exchange has been somewhat easier, and the Council bills offered in London were taken at an average of 16d. per rupee. The demand for bills has fallen off considerably. There has been moderate buying of silver for Indian account.

The foreign merchandise trade of France for the two months ending February 28 is valued by the Ministry of Commerce as follows:

	1902.	1903.
Imports	Fr. 705,886,000	Fr. 772,065,000
Exports	652,402,000	695,168,000
Excess, imports	Fr. 53,484,000	Fr. 76,897,000

This shows an increase of 66,179,000 fr. in imports; an increase of 42,766,000 fr. in exports; and an increase of 23,413,000 fr. in the excess of imports.

The movement of gold and silver in France in the month of January is reported as follows:

	1902.	1903.	Changes.	
Gold:				
Imports	Fr. 25,902,000	Fr. 23,778,000	D. Fr.	2,124,000
Exports	10,026,000	5,066,000	D.	4,960,000
Exc., imp.	Fr. 15,876,000	Fr. 18,712,000	I. Fr.	2,836,000
Silver:				
Imports	6,305,000	4,815,000	D.	1,490,000
Exports	6,715,000	5,909,000	D.	806,000
Exc., exp.	Fr. 410,000	Fr. 1,094,000	I. Fr.	684,000

Imports of copper and nickel coins, rated at their face value, were 5,000 fr., against 6,000 fr. in 1902. Exports were 17,000 fr., against 432,000 fr. last year.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$.38½	$ 40½
Peruvian soles and Chilean pesos	.36	.39
Victoria sovereigns	4.85	4.88
Twenty francs	3.86	3.88
Twenty marks	4.74	4.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

Mar.–Apr.	Sterling Exchange	Silver N. Y. Cts.	Silver London, Pence.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton	Tin, Cts. per lb.	Lead Cts. per lb.	Spelter N. Y. Cts. per lb.	Spelter St. L. Cts per lb.
				14⅞	14¾	63½		4.60	5.50	5 3"½
26	4.8690	48⅝	22 7/16	@15½	@14⅞	64¼	30	@4.65	@5.55	@5.35
				14⅞	14¾		30½	4.60	5.50	5.32½
27	4.8690	49¼	23¼	@15½	@14⅞	64¼	@30½	@4.65	@5.55	@5.35
				14⅞	14¾		30½	4.60	5.50	5 3"½
28	4.86¾	49	23½	@15½	@14⅞	....	@30½	@4.65	@5.55	@5.35
				14⅞	14¾			4.60	5.50	5.32½
30	4.86¾	49½	22 11/16	@15½	@14⅞	64⅞	30½	@4.65	@5.55	@5.35
				14⅞	14¾			4.60	5.50	5.32¼
31	4.86¾	49¼	22¾	@15½	@14⅞	63½	30½	@4.65	@5.55	@5.35
				14⅞	14¾	63¾	30¼	4.60	5.50	5.32¼
1	4.86¾	49¼	22 11/16	@15½	@14⅞	@ 63⅞	@30¼	@4.65	@5.55	@5.35

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures

Copper has ruled quiet but steady throughout the week, and nothing of special interest has transpired. Consumers continue to assume a waiting attitude in spite of the fact that consumption both here and abroad remains very satisfactory indeed. Exports during the month of March have been very heavy. We quote Lake copper at 14⅞@15⅛c.; electrolytic copper, in ingots, cakes and wirebars, at 14¾@14⅞c.; in cathodes, at 14½@14⅝c.; casting copper, at 14½@14⅝c.

The market for standard copper in London, which closed last week at £64 15s., opened on Monday at £64 17s. 6d., and the closing quotations on Wednesday are cabled as £63 15s.@£63 17s. 6d. for spot, £63 17s. 6d.@£64 for three months.

Statistics for the second half of March show an increase in the visible supplies of 800 tons.

Refined and manufactured sorts we quote: English tough, £68@£69; best selected, £69 10s.@£70 10s.; strong sheets, £77@£78; India sheets, £74 10s.@£75 10s.; yellow metal, 6⅝@6¼d.

Exports of copper from Atlantic ports in the week ending March 31, are reported by our special correspondents as follows: Great Britain, 344 long tons; Germany, 175; Holland, 1,475; France, 645; Austria, 170; Russia, 50; Sweden, 70; Italy, 106; Belgium, 35; Brazil, 1; total, 3,071 tons. Imports of copper were 100 tons from Great Britain, and 282 tons from Mexico; total, 382 tons.

Imports of copper into the United States, in all forms, with re-exports of foreign copper, are reported by the Bureau of Statistics of the Treasury Department as below, the figures being in long tons, of 2,240 lbs.:

Fine Copper:	1902.	1903.	Changes.
Imports	4,060	8,311	I. 4,311
Re-exports	984	934	D. 50
Net imports	3,016	7,377	I. 4,361
Ores and Matte:			
Imports	8,128	40,937	I. 32,809
Re-exports	3,204	2,248	D. 956
Net imports	4,924	38,689	I. 33,765

Of the imports of fine copper this year 6,535 tons, or 78.7 per cent of the total, came from Mexico, and 1,396 tons, or 16.8 per cent, from Great Britain. Of the imports of ore and matte 39,738 tons, or 96.9 per cent, were from Canada; a large part of these imports being British Columbia ores brought to the Northport Smelter.

The returns do not separate ore and matte, so that it is impossible to give the copper contents exactly. A close estimate, however, gives the total copper contents of the net imports this year at 13,393 long tons of fine copper.

Exports of domestic copper in January are given by the Bureau of Statistics as follows, in long tons:

	1902.	1903.	Changes.
Fine copper	28,974	20,699	D. 8,275
Ores and matte	4,725	1,081	D. 3,644

Again estimating the ores and matte, we find the total quantity of fine copper exported, in all forms, this year, approximately 21,023 long tons, against 31,407 tons last year; a decrease of 10,384 tons, or 33.1 per cent.

Chilean Copper Market.—Messrs. Jackson Brothers write from Valparaiso, Chile, under date of February 20, that recent sales of bar copper amounted to 17,072 quintals, at an average of $34.80, Chilean currency, per quintal, f. o. b. coast port. Sales of matte were 800 tons at $15.05, Chilean currency, per quintal, basis of 50 per cent copper. Copper ores were nominal, with no sales.

Tin.—The market has again been rather narrow, consumers confining their purchases to near-by delivery and actual requirements. Arrivals have been heavy for some time past; and while at one time 30⅝c. was paid for spot tin, the market closes rather weak in consequence of the lower cables from abroad, the quotation being 30¼@30⅜c.

The foreign market, which closed last week at £137 5s., opened on Monday at £139, advanced on Tuesday to £139 10s., and the closing quotations on Wednesday are cabled as £138 15s.@£138 17s. 6d. for spot; £138 12s. 6d.@£138 15s. for three months.

Statistics for the month of March show an increase in the visible supplies of 1,000 tons.

Imports of tin into the United States for the two months ending February 28 are reported as follows, in long tons, of 2,240 lbs.:

	1902.	1903.	Changes.
Straits	3,703	2,061	D. 1,642
Australia	85	32	D. 53
Great Britain	1,846	3,594	I. 1,748
Holland	207	91	D. 116
Other countries	61	131	I. 70
Total	5,902	5,909	I. 7

Heavy receipts in February of this year made up for the light imports in January. The largest imports this year were of Straits tin by way of Great Britain; receipts of Straits tin direct were comparatively light.

Lead continues in good demand, but the trade is still complaining about unsatisfactory shipments. The ruling quotations are 4.52½@4.57½c., St. Louis; 4.60@4.65c., New York.

The foreign market has been rather depressed, Spanish lead being quoted at £12 10s.@£12 12s. 6d.; English lead, 2s. 6d. higher.

Imports of lead in all forms into the United States, with re-exports of foreign lead, are reported by the Bureau of Statistics of the Treasury Department, as follows, in short tons, for the two months ending February 28:

	1902.	1903.	Changes.
Lead, metallic	956	35	D. 921
Lead in ores and base bullion	17,470	17,227	D. 243
Total imports	18,426	17,262	D. 1,164
Re-exports	13,329	10,195	D. 3,134
Balance	5,097	7,067	I. 1,970

Of the imports this year 14,949 tons, or 86.4 per cent of the total, were from Mexico; and 1,490 tons, or 8.6 per cent, from Canada. In addition to the lead re-exported, 26 tons of domestic lead were exported this year, against 1 ton last year.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 14, that the price of silver for the week has been 12 reales per ounce. The exchange has gone up by 4 centimos, making it 33.74 pesetas to £1. The local quotation for pig lead on wharf has been 71.25 reales per quintal, which on above exchange is equal to £11 16s. 4d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports of pig lead have been 1,214,829 kgs. to London; 304,000 kgs. to Taganrog; a total of 1,518,829 kgs. for the week.

Spelter has been very quiet throughout the week, and some concessions have been made for future delivery. Spot metal, however, remains scarce, and is commanding a premium. We quote at the close 5.32½@5.35c., St. Louis; 5.50@5.55c., New York.

The foreign market remains firm, good ordinaries being quoted at £23 5s.; specials at £23 10s.

Exports of spelter from the United States in the two months ending February 28 were 517 short tons, against 685 tons in the corresponding period in 1902; a decrease of 168 tons, or 24.5 per cent. Exports of zinc ores were 8,763 tons, against 6,086 tons last year; an increase of 2,677 tons, or 44.0 per cent.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 14, that ore is in good demand, and prices continue to improve, especially for blende.

Antimony is dull and unchanged at last week's quotations: Cookson's, 8¼c.; Hallett's, 6¾@6⅞c.; Hungarian, French, Italian, United States and Japanese, 6½@6⅝c.

Im ports of antimony into the United States for the two months ending February 28 were as follows, in pounds:

	1902.	1903.	Changes.
Metal and regulus	584,164	728,722	I. 144,558
Antimony ore	138,263	614,906	I. 476,643

The increase in metal imports was 24.8 per cent; while that in antimony ore was 344.7 per cent.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Exports of nickel, nickel oxide and nickel matte from the United States for the two months ending February 28 were 332,321 lbs., against 677,070 lbs. in the corresponding period of 1902; a decrease of 344,749 lbs., or 59.2 per cent.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Imports of platinum into the United States for the two months ending February 28 were 1,206 lbs., against 814 lbs. in the corresponding period in 1902; an increase of 392 lbs., or 48.2 per cent.

Quicksilver.—The New York price is $47 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. 6d. per flask, with the same quotation from second hands.

Exports of quicksilver from the United States for the two months ending February 28 were 92,045 lbs., against 124,808 lbs. in the corresponding period in 1902; a decrease of 32,763 lbs., or 26.2 per cent.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum.	Per lb.
No. 1, 99% ingots	33@37c.
No. 2, 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N.Y.)	80c.
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanium (20@25%, N. Y.)	55c.
Ferro-Tungsten (37%)	28c.
Magnesium	$2.75
Manganese, pure (N.Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus	45c.
American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Missouri Zinc Ore Market. March 28.

(From Our Special Correspondent.)

Buyers for four different lead interests were in the field for this ore during the week, and the increased demand advanced the price to $59.50 per ton, $1 higher than last week, with rumored but unconfirmed sales reported at $60 per ton, a figure that cuts down the allowance for smelting charges to $4 per ton, or $3 less than the customary charge, based on the present pig lead market.

A rumor that the top price for zinc ore had been advanced to $42 per ton, or $1 higher, could not be verified, and the market is quoted strong at prices current the previous week, two lots selling at $41 per ton, and the assay basis remaining at from $35 to $37 per ton for 60 per cent zinc. Inability to secure ore from the Northern or Western zinc mines at this season of the year puts a greater demand upon this district just now, and although the reserve ore, purchased several weeks ago, but left in the bins because of bad roads, is now being rapidly depleted, and a number of the best mines are working double shift, the output is still unequal to the demand.

Following are the shipments of zinc and lead from the various camps of the Joplin District for the week ending March 28, 1903.

	Zinc, Pounds.	Lead, Pounds.	Value.
Joplin	3,821,190	286,620	$73,807
Webb City-Carterville	2,176,400	575,760	53,984
Galena-Empire	1,233,390	120,620	25,369
Duenweg	552,430	269,710	17,347
Carthage	567,610	.....	10,212
Alba-Neck	492,520	.....	8,373
Prosperity	164,520	103,280	5,926
Zincite	271,210	11,350	5,131
Aurora	410,050	12,510	4,970
Spurgeon	188,920	68,130	4,466
Granby	220,000	28,000	3,505
Badger	179,800	.....	3,496
Carl Junction	160,470	.....	3,049
Central City	164,580	15,530	2,935
Cave Spring	54,630	15,450	1,549
Reeds	66,230	.....	1,126
Oronogo	34,330	13,380	1,023
Wentworth	42,200	.....	633
District totals	10,799,390	1,520,340	$226,906
Total three months	116,763,360	13,590,020	$2,225,121

To-day ends the first three months of this year, and the total district value of mineral marketed aggregates $2,225,121, a gain of $42,792 over last year. The total shipment to date is 58,382 tons of zinc, which sold at an average price of $31.85 per ton; and 6,795 tons of lead, which sold at an average price of $53.75 per ton. For this same period of last year there was marketed 66,857 tons of zinc, which sold at an average of $27.45 per ton, and 8,069 tons of lead, which sold at an average of $43 per ton. The shipment for this year is shown to be 8,475 tons less of zinc, and 1,274 tons less of lead than for last year, the higher prices giving the increase in the district values.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.; for March, 5.174c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63.85	53.39
April	.....	11.618	.....	11.986	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.03
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†Am. Sm. & Ref., pf.	April 7	1.75	875,000	10,641,353
*Bald Butte, Mont.	April 15	.06	15,000	1,357,148
*Bunker Hill & Sull.	April 4	.03	9,000	1,478,000
†Central Coal & C., com	April 15	1.50	76,875	397,500
†Central Coal & C., pf.	April 15	1.25	23,437	749,998
*Con. Mercur, Utah	April 9	.03	30,000	970,000
*Daly West, Utah	April 15	.60	108,000	2,691,000
†Doe Run, Mo.	April 15	1.50	22,500	582,072
*Empire State, Idaho	April 15	.05	25,277	1,662,770
*Four Oil, Cal.	April 10	.01	2,087	33,392
†Iowa, Colo.	April 15	.01	16,667	303,503
†Mary McKinney, Colo.	April 10	.03	30,000	530,000
§Penna. Salt	April 15	3.00	150,000	13,300,000
Pittsburg Oil, Cal.	April 1	.02½	7,500	7,500
†Pittsburg Coal, pf.	April 15	1.75	519,771	7,276,794
*Silver King, Utah	April 10	.66⅔	100,000	6,450,000
*Thirty-Three Oil Cal.	April 6	.10	10,000	160,000
†United Zinc, com.	April 15	.05	3,882	22,961
†United Zinc. pf.	April 15	.50	8,520	99,095
†Va.-Car. Chem., pf.	April 15	2.00	240,000	6,540,000
§Westmoreland Coal	April 15	1.50	375,000	7,875,000

* Monthly. † Quarterly. § Semi-annual.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Alaska	Utah	..	Apr. 14	Apr. 30	.03
Alma	Cal.	..	Apr. 27	.....	.15
Brunswick Con.	Cal.	..	Apr. 6	.....	.03
Caledonia	Nev.	..	Apr. 15	May 4	.15
Con. New York	Nev.	17	Apr. 7	Apr. 28	.05
Fremont Con.	Cal.	..	Apr. 20	.....	.20
Gold Hill	Cal.	..	Apr. 15	.....	.12
Gould & Curry	Nev.	..	Apr. 17	May 6	.15
Kennedy	Cal.	..	Apr. 20	.....	1.00
Occidental	Nev.	41	Mar. 24	Apr. 14	.05
Ophir	Nev.	..	Apr. 10	Apr. 30	.15
Shenandoah Con.	Cal.	..	Apr. 14	.....	.02
Overman	Nev.	12	April 7	April 28	.10
Tonopah & Salt Lake	Nev.	1	Mar. 28	Apr. 17	.10
Vulcan Sm. & Ref.	Cal.	..	Apr. 6	.....	.10
Wabash	Utah	2	Apr. 21	May 14	.05

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Mar. 25. H.	Mar. 25. L.	Mar. 26. H.	Mar. 26. L.	Mar. 27. H.	Mar. 27. L.	Mar. 28. H.	Mar. 28. L.	Mar. 30. H.	Mar. 30. L.	Mar. 31. H.	Mar. 31. L.	Sales
Acacia, Colo	$1	....	....	....	....	.07½	....	....	....	....	....	....	....	1,000
Alice, Mont.	25	....	....	....	....	....	....	....	....	.28	....	....	....	100
Amalgamated c., Mont	100	71¼	68	69	66½	68¾	66¾	67⅝	66⅜	67⅝	65⅞	67¼	64⅜	411445
†Anaconda c. Mont.	25	116	114	116	114	116	....	....	....	108	....	112	110	5,100
Anaconda Gold, Colo.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Chollar, Nev.	3	....	....	....	....	....	....	....	....	.37	....	....	....	200
Chrysolite, Colo.	50	....	....	....	....	....	....	....	....	....	....	....	....	....
Comstock T., s., Nev.	2	11⅛	....	12	11	11	10	....	....	10	09½	....	....	4,500
Comst T. Bonds	100	....	....	....	....	....	....	....	....	....	....	68½	....	1,000
Con. Cal. & Va., g. s. Nev	2½	....	....	2 05	....	....	....	....	....	1.70	....	1.60	....	300
Crown Point, Nev.	3	....	....	....	....	37	.36	....	....	....	....	....	....	300
Daly, Utah	20	....	....	....	....	....	....	....	....	2.56	....	....	....	100
Elkton g., Colo.	1	.36	....	.33	....	....	....	....	....	.37	....	....	....	1,000
El Paso, Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Dollar, Colo.	1	....	....	.05	....	....	....	....	....	....	....	....	....	3,000
Gould & Curry, Nev.	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Greene Con., c., Mex.	10	25	24¾	25	24¾	....	25⅛	24⅝	24⅜	....	....	23½	23	10,580
Hale & Norcross	3	....	....	.80	....	....	....	....	....	.66	....	....	....	600
Homestake, S. Dak.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver, Utah.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Isabella, g., Colo.	1	....	....	.20	....	.20	....	....	....	....	....	.20	....	1,800
Justice, Nev.	1	.15	....	.16	....	.12	....	....	....	....	....	....	....	11,400
King & Pembroke, Ont	10	.10	....	....	....	....	....	....	....	....	....	....	....	500
Leadville, Colo.	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Little Chief, Colo.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican, Nev.	3	1.50	....	....	....	1.40	....	....	....	....	....	....	....	300
Mollie Gibson, Colo.	5	.07½	....	....	....	....	....	....	....	....	....	....	....	1,000
Moon-Anchor, Colo.	5	.09	....	....	....	....	....	....	....	.09	....	....	....	1,100
Ontario, Utah.	100	6.00	....	....	....	....	....	....	....	5.75	5.00	....	....	480
Ophir, s., Nev	1	2.10	....	2 00	....	1 90	....	....	....	1.60	....	1 50	....	1,300
Overman, Nev.	1	....	....	....	....	....	....	....	....	1.70	....	....	....	200
Pharmacist, Colo.	1	....	....	.03	....	....	....	....	....	.04	....	....	....	2,000
Phoenix, Ariz.	1	.03	....	....	....	....	....	....	....	....	....	....	....	200
Portland, Colo	10	1.35	....	1 37	....	....	....	....	....	1.45	....	1 40	....	500
Potosi, Nev.	3	....	....	....	....	33	....	....	....	.33	....	.34	....	1,200
Quicksilver, Cal.	100	....	....	....	....	1.75	....	....	....	....	....	....	....	100
Quicksilver, pfd.	100	....	....	....	....	8.00	....	....	....	....	....	....	....	100
Savage, Nev.	2½	....	....	....	....	.34	....	....	....	.33	....	....	....	600
Silver Hill, Nev	1	.63	....	....	....	....	....	....	....	....	....	....	....	100
Small Hopes, Colo.	20	....	....	....	....	....	....	....	....	.50	....	....	....	100
Standard, Cal.	10	3.25	....	....	....	....	....	....	....	....	....	3.40	....	500
Tenn. c., Tenn	25	32	30	31	30	31	29½	30½	30	....	....	30¾	30	3,750
Union Cop., N. C.	10	2⅜	....	2½	....	....	....	2⅜	2¼	....	....	....	....	1,060
White Knob, g. s., Ida	100	....	....	10¼	10	10¼	....	....	....	....	....	11	....	1,120
Yellow Jacket, Nev.	3	....	....	....	....	....	....	....	....	.44	....	....	....	100

Total sales 458,735 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Mar. 25. H.	Mar. 25. L.	Mar. 26. H.	Mar. 26. L.	Mar. 27. H.	Mar. 27. L.	Mar. 28. H.	Mar. 28. L.	Mar. 30. H.	Mar. 30. L.	Mar. 31. H.	Mar. 31. L.	Sales
Adventure Con., c.	$25	100,000	11¼	10	10¾	10	10¾	10	11	....	10¾	10¼	10⅜	10⅜	1,025
Allouez	25	80,000	7⅜	7	7⅛	7	7¼	6⅞	7	6⅝	7	6⅝	7¼	6⅝	8,018
Amalgamated c.	100	1,538,879	71¼	68	69	66⅝	69	66¼	68	66⅝	67¼	65⅝	67¼	64⅜	50,540
Am. Z. L. & Sm.	25	60,000	11¾	....	11	....	....	....	....	....	....	....	....	....	100
Anaconda, c.	25	1,200,000	....	....	28¼	28¼	....	....	....	....	....	....	28¼	27	190
Arcadian, c.	25	150,000	4⅝	4½	....	....	....	....	4¼	....	4¼	4⅛	4⅜	....	930
Arnold	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, c.	25	100,000	12⅜	....	12½	12	12⅛	12	12¼	12	12	....	11⅜	11	1,584
Bingham Con., g. s.	50	150,000	33⅜	33⅜	33⅛	33	33¼	32½	32⅜	32½	32¼	31	31	30½	4,204
Bonanza	10	300,000	....	....	....	....	.80	....	....	....	.85	.80	....	....	175
British Columbia	15	250,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Cal. & Hecla, c.	25	100,000	535	530	528	525	530	....	525	....	525	....	530	525	147
Catalpa	10	300,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Centennial, c.	25	90,000	27¼	26½	27¾	26¼	27¾	26	26½	26	26	24½	26¾	24	6,736
Central Oil	25	60,050	....	....	....	....	....	....	....	....	7	....	....	....	25
Con. Mercur, g.	5	1,000,000	1⅜	....	1⅜	1 7/8	1 13/16	1⅜	....	....	1⅜	....	1 5/8	1 1/2	13,495
Continental Zinc	25	22,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Range Con.	100	285,000	69	67	68	66	67¾	66	66	64½	65¾	62¾	64	61½	22,817
Daly-West, g. s.	20	180,000	42½	42	42	....	42	....	42¼	42	42½	42	42⅜	....	1,023
Dominion Coal,	100	150,000	†116	114½	114½	113	†113½	112	112	107¼	†110½	107½	110¼	106	10,625
Dominion Coal, pf.	100	30,000	....	....	....	....	....	....	....	....	116	115	....	....	90
Dominion I & S.	100	100,000	33	32	31½	30	30¼	28¾	....	....	28⅜	25¼	28½	25⅜	17,465
Elm River	12	100,000	4⅜	4	4	3⅝	4 1/16	3⅜	....	....	3⅞	....	3⅞	....	2,075
Franklin, c.	25	100,000	12	11⅜	11⅝	11⅜	....	....	11¾	....	12⅛	11	11⅜	....	660
Guanajuato, Con.	5	385,000	2	1⅜	....	....	1⅜	1⅜	1⅜	....	1⅜	....	2	1⅜	3,035
Isle Royale Con., c.	25	385,000	13	....	13	12	....	....	12	....	12	....	12¾	....	600
Mass Con., c.	25	100,000	10½	10⅜	10¾	10	10⅜	10	10	9½	10¾	9¾	10	9½	2,110
Mayflower, c.	25	100,000	2	....	2	....	....	....	2	....	....	....	2	....	500
Michigan, c.	25	100,000	10	9⅝	....	....	....	....	9½	....	9¾	9⅝	....	....	295
Mohawk, c.	25	100,000	54⅜	53⅜	54¼	53	55	54	54	53⅛	53	52	52⅝	50⅛	1,943
Mont. Coal & Coke	25	200,000	7¾	....	....	8	7⅝	7⅞	7⅞	....	7¾	7¾	7⅝	....	2,268
Mont'l & Boston, c.	5	570,000	....	....	1⅝	1½	....	....	....	....	....	....	....	....	1,870
New Idria, g.	5	100,000	....	....	....	....	....	....	....	....	....	....	....	....	....
North Star	10	250,000	....	....	....	....	....	....	9	....	....	....	....	....	100
Old Colony, c.	25	100,000	....	....	2	....	....	....	....	....	2	....	1⅝	....	250
Old Dominion, c.	25	150,000	19¼	19	19	....	18½	18¾	18	....	18½	....	18	....	2,339
Osceola, c.	25	96,150	72	70	70	....	72	70¾	70½	69	70	68⅜	70	68	1,598
Parrot, s. c.	10	229,850	32	....	31	30¾	31	....	....	....	30	....	29¾	28¾	1,610
Phoenix Con., c.	25	100,000	8¼	6	5⅝	....	5¼	....	5½	....	6	....	6	....	530
Quincy, c.	25	100,000	118	....	116	....	115	114	114½	....	....	....	115	....	84
Rhode Island, c.	25	100,000	3	....	3	....	3¼	....	3	....	3	....	3	....	1,360
Santa Fe, g. c.	10	250,000	2¼	....	2⅜	....	2¾	....	2⅜	2¼	2¼	....	2¼	....	1,470
Shannon, c.	10	183,236	13⅜	....	13	12⅝	13¼	13	13⅜	12⅝	13¼	12⅜	13¼	12⅛	3,490
Tamarack, c.	25	60,000	175	....	165	160	163	160	160	....	....	....	163	157	329
Tecumseh	25	60,000	....	....	....	....	....	....	....	....	1	....	....	....	20
Tennessee	25	175,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Trimountain	25	100,000	94	92	94	....	....	....	....	....	92	90	90	....	942
Trinity, c.	25	160,000	11¼	11	11	10¾	11¼	10¾	10¼	....	10¾	10	11	10	1,881
United States, g.	25	419,000	24⅞	23⅜	24⅞	24	24¾	24½	24¼	24⅜	24⅜	24½	24⅝	24¼	13,954
U. S. Coal & Oil	25	240,000	15¼	15	15½	15	15⅝	14⅜	15	14⅜	15	14¾	15	14½	3,805
Utah Con., g.	5	300,000	29⅜	29	29	28	29½	28¾	28¼	28¾	29¼	28⅜	29½	28⅜	13,519
Victoria, c.	25	160,000	7⅛	7	7¼	7	7¼	7¼	7	6⅞	6¾	6½	6⅝	6½	1,961
Washington	25	60,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Winona, c.	25	100,000	12¼	11½	11¾	11	12	11¼	11⅛	10¾	10¾	10¼	10½	9¾	8,175
Wolverine, c.	25	60,000	**74	73	74	73	†74⅜	74	....	....	†73	....	73	72	378
Wyandot	25	100,000	2½	2	2¼	2	....	....	2	....	2	....	2	....	1,780

** Ex-Rights * Boston Stock Exchange. † Ex Dividend. ‡ Assessment Paid. Total sales, 213,865 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Mar. 25. H.	Mar. 25. L.	Mar. 26. H.	Mar. 26. L.	Mar. 27. H.	Mar. 27. L.	Mar. 28. H.	Mar. 28. L.	Mar. 30. H.	Mar. 30. L.	Mar. 31. H.	Mar. 31. L.	Sales
Allis-Chalmers, U. S.	100	19½	18	18½	18	....	....	18	17	18	....	18	....	1,000
Allis-Chalm's, pf, U.S.	100	....	....	....	....	....	....	87	....	....	....	....	....	....
Am. Agr. Chem., U.S.	100	....	....	....	....	....	....	25	22¼	....	....	....	....	100
Am. Agr. Chem. pf, U.S.	100	....	....	....	....	....	....	80	79	....	....	....	....	....
Am. Sm. & Ref., U.S.	100	48¾	47½	48⅝	47½	49¾	47¾	48⅜	47⅝	48⅝	47⅝	48⅜	47⅜	27,450
Am. Sm. & Ref. pf, U.S.	100	95	....	94½	....	94½	93⅜	93¼	93	93⅜	....	93⅞	93	4,863
Am. Steel & Fdy., U.S.	100	16	....	....	....	15½	....	....	....	....	....	....	....	100
Am. S. & Fdy. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	851
Col. Fuel & I., Colo.	100	68	65½	66⅜	65	65¼	64¼	64½	....	65	63¼	64⅜	63⅛	5,400
Col. & H. C. & I., Colo.	100	20½	20¼	....	....	....	....	....	....	20	19½	20⅜	20	1,600
†Crucible Steel, U. S.	100	19¼	19	19	18⅝	19	....	19	....	19½	18¾	18½	18¼	8,050
†Crucible Steel, pf, U S	100	84	....	84	....	83⅛	83¼	83¾	83½	83¾	83⅛	83⅛	83⅜	1,876
†Mong. R. Coal, Pa.	100	....	....	11	....	....	....	....	....	....	....	....	....	250
†Mong. R. Coal pf, Pa	100	39⅝	38	39¼	....	39½	39	....	....	39⅜	39	....	....	851
National Lead, U.S.	100	26¼	25⅝	25¾	25½	26	25½	26⅛	26	25¾	25	26	25½	2,700
National Lead pf, U.S.	100	91⅜	91	....	....	....	....	....	....	....	....	....	....	300
†Phila Nat. Gas	100	45¾	46¼	46¼	46	46	....	46	45⅞	46¼	46	....	....	1,024
†Phila Nat. Gas, pf	100	....	....	....	....	....	....	90⅝	....	....	....	....	....	....
†Pittsburg Coal, Pa.	100	29¼	29½	....	....	29	....	28¾	....	28⅜	....	28⅝	....	1,000
†Pittsburg Coal pf, Pa	100	90½	90⅜	90¾	....	90¾	90½	90¾	....	90¾	90⅜	90¾	90⅜	1,316
Republic I & S., U.S.	100	20	19¾	20½	19⅝	20	19¾	19⅝	19⅜	19⅝	19¼	19⅝	19	6,500
Republic I. & S., pf, U.S.	100	....	....	77¾	77⅜	78½	78	77½	....	77¾	76½	77	76¼	2,085
Sloss-Shef S. & I., Ala.	100	62	61½	....	....	61½	61	60	59¾	59¾	58½	59⅜	53	5,020
Sloss-Shef S. & I. pf, Ala.	100	93¼	....	....	....	93¾	....	....	....	....	....	....	....	115
Standard Oil, U.S.	100	680	....	678	675	676	670	670	667	670	668	670	668	151
Tenn. C. I. & R. R., Ala.	100	66¼	65¼	66⅝	65⅛	66⅝	64	65	64	65	63⅞	65	63⅝	23,360
U. S. Red & Ref., U. S.	100	....	....	....	....	....	....	....	....	30	....	....	....	100
U.S. Red & R. pf., U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S. Steel Corp., U.S.	100	36⅜	36	36¼	35⅞	36¾	35⅞	36	35¼	37⅛	35⅞	35⅝	35¼	74,010
U.S. Steel Corp. pf, U.S.	100	86¼	86⅛	86¾	86¼	86⅞	85⅞	86	84½	85½	84½	85⅛	84⅝	53,820
Va.-Car Chem., U.S.	100	62¾	62	62⅝	61¾	62½	61¾	62	62	61¾	....	62¾	62¼	2,575
Va.-Car Chem. pf, U.S.	100	....	....	....	....	....	....	....	....	....	....	....	....	200
Va. I. C. & Coke, U. S.	100	....	....	30½	....	....	....	....	....	....	....	33¼	35⅜	700
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

* New York Stock Exchange. † Pittsburg Stock Exchange. Total sales, 227,016 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Mar. 23. H.	Mar. 23. L.	Mar. 24. H.	Mar. 24. L.	Mar. 25. H.	Mar. 25. L.	Mar. 26. H.	Mar. 26. L.	Mar. 27. H.	Mar. 27. L.	Mar. 28. H.	Mar. 28. L.	Sales
Acacia	$1	.09¼	.08¾	.08¼	.07½	.08	.07	.07½	.07	.07¾	.07	.07¾	.07	6,000
C. C. & M.	1	.02½	.02	.02½	.02	.02½	.02	.02⅝	.02	.02⅛	.02	.02¼	.02	3,000
Am. Con.	1	.02¼	.02⅜	.02⅝	.02	.02⅝	.02	.02⅝	.02	.02⅝	.02	.02¼	.02	10,000
Anaconda	1	.18	....	.17	.15	.16	.13¾	.16	.15	.16	.15	.16	.15	100
Ben Hur	1	.02¾	....	.03	....	.02½	.01¾	.02½	.01¾	.02¼	.02	.02⅛	.02⅛	....
Coriolanus	1	.03½	.02¼	.04	.02	.04½	....	.04	....	....	....	.04	....	2,000
Blue Bell	1	.08	....	.07¼	....	.07¾	....	.07¼	....	.07½	....	.07	.04	....
C. K. & N.	1	.17	.16	.16¾	.16	.18	.17	.20	.17½	.20½	.20	.19½	.18	12,100
C. C. Con.	1	.05	.04½	.04¾	.04½	.04¾	.04½	.04¾	.04	.05	.04½	.05	.04	4,000
Des Moines	1	....	.02½	....	.02¼	.03	.02¼	.03	.02¾	.03	.02½	....	.02⅜	....
Dr. Jack Pot	1	.09½	.09¾	.09⅜	....	.09	.09	.09¾	.09½	.09¾	.09	.09¾	.09	18,000
Elkton Con.	1	.35⅛	.34¾	....	.33½	.34	.32	.34¾	.34	.35¾	.35	.35½	....	27,500
El Paso	1	.57½	.57	.57½	.57	.57	.56	.56	.55¾	.56½	....	.57	....	10,100
Fannie Rawlings	1	.04	....	.04	.02	.04	.02	....	.02½	.02½	....	.03	.02	1,000
Findley	1	.11¾	.11¾	.11¾	.11¾	.12	.11¾	.11¾	....	.11¾	....	.2½	.11¾	18,000
Gold King	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Gold Dollar Con.	1	.04¾	.04¾	.04½	.04¾	.04¾	.04½	.04⅝	.04¾	.04¾	.04½	.04¾	.04½	46,000
Golden Cycle	1	.70	.65	.69	.68	.69	.67	.68¼	.68	.70	.68	.68	....	3,000
Golden Fleece	1	....	....	.11	....	.11	....	.11	....	.11	....	.11	....	....
Gould	1	.04½	.03¾	.04	.03	....	....	.04½	.03	.04¼	.03	.04¼	.03¼	....
Hart	1	....	.02	....	.02	....	.02	....	.02	....	.02	....	.02	....
Isabella	1	.17¾	.17½	.17¾	.17	.17	....	.17½	.17¾	.18¾	.17⅝	.18¾	.18	23,600
Jack Pot	1	.10¾	.09	.10¾	.09	.10	.08¾	.10	.08¾	.10	.09	....	.08¾	2,300
Last Dollar	1	.35	.22	.35	.22	.35	.22	.35	.22	.60	.15	.50	....	....
Lexington	1	.04½	.04	.04¾	.04	.04½	.04	.05½	....	.04¾	.04¼	.05	.04¾	....
Little Puck	1	.03	.02¾	.02¾	....	.01¼	.01¾	.02½	.02¼	.03	.02½	.03¼	.02⅝	6,000
Mollie Gibson	1	.07	.05½	.07	.05	....	.05½	.05½	....	.08	.06	....	.06¾	....
Moon Anchor	1	.08¾	.08	.09	.08	....	.07½	.08¾	.08	.08¾	.08	.09	.08	1,400
New Haven	1	....	....	.02¾	.02¾	.02¾	.02¾	.02¾	.02	.02¾	.02	.02¾	.02¼	6,000
Pharmacist	1	.04¾	.04½	.04¾	.04	.04	....	.04½	.04	.04½	.04	.04¼	.04½	3,000
Pinnacle	1	....	.04¾	....	.04¼	.05¾	.04½	.04¾	.04¼	.04¾	.04¼	.04¾	.04¼	5,000
Pointer	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Portland	1	1.37	1.30¾	1.33	1.32	1.36	1.32	1.40	1.32	1.40	1.33	1.40	1.36	1,800
Prince Albert	1	....	....	.03	.02	.03	.02	.03	.02¼	.02¾	.02½	.03	.02½	1,000
Vindicator	1	1.00	.95	1.00	.95	1.00	.90	.97¾	....	1.00	....	.97	.94	3,000
Work	1	.06½	.05¾	.06¼	.05¾	.06¼	.05⅝	.06	.05¾	.06	.05¾	.06¾	.06	2,000

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 218,900 shares.

COLORADO SPRINGS. (*By Telegraph.*)

Name of Company.	Mar. 30. H.	Mar. 30. L.	Mar. 31. H.	Mar. 31. L.	Name of Company.	Mar. 30. H.	Mar. 30. L.	Mar. 31. H.	Mar. 31. L.
Acacia	.09	.07¾	.08¼	.08	Golden Cycle	.70	.67	.70	.67¾
Am. Con	.02¾	.02½	.02½	.02¾	Golden Fleece	.11	.05	.11	.05
Anaconda	.16	.15	.16	.15	Isabella	.18¾	.18	.18½	.18¼
Cripple Creek Con.	.05¼	.04¾	.05¼	.04⅜	Jack Pot	.09½	.08¾	.10	.08¾
C. K. & N.	.19½	.17	.19¾	.14¾	Last Dollar	....	....	....	.20
Doctor Jack Pot	.09¾	.08¼	.09¾	.08¾	Mollie Gibson

STOCK QUOTATIONS.

MEXICO*. March 20.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200	.....	1,000	.....
Guanajuato.				
Angustias, Pozos	2,400	5.00	80	90
Cinco Senores y An., aviadoras	2,000	15.00	230	235
Cinco Senores y An., aviada	400	10.00	215	220
Providencia, San Juan de la Luz	6,000	2.00	180	190
Queensland y Australia	300	.....	110	120
Guerrero.				
Garduno y Anexas	7,200	.....	35	60
Hidalgo.				
Amistad y Concordia	9,600	5.30	70	71½
Carmen, aviada	1,100	.....	115	125
Guadalupe Fresnillo mill	1,000	.....	250	300
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	1,200	1,300
La Blanca, aviada	768	.....	850	900
La Reina y An., aviadora	5,600	.....	20	28
Maravillas y An., aviador	1,680	.....	.....	.....
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	650	700
Santa Ana y An., aviadora	1,800	.....	30	35
Santa Ana y An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80½	81
Santo Tomas Apostol aviadoras	5,100	.....	1	2
San Felipe de Jesus, aviadora	3,600	.....	.....	40
San Felipe de Jesus, aviada	1,200	.....	10	12
San Rafael y An., Trompillo	1,200	12.00	910	920
San Rafael y An., aviada	1,200	$8.00	$395	$400
Soledad, aviada	960	5.00	325	375
Sorpresa, aviada	960	5.00	280	300
Mexico.				
Alacran	2,400	.....	30	40
Buen Despacho	3,000	.....	55	60
Dos Estrellas	3,000	30.00	1,850	.....
La Esperanza (El Oro)	3,000	10.00	1,180	1,190
La Reformia, aviadores	2,000	.....	58	60
Santa Ana, Esperanza	2,400	.....	70	96
Michoacan.				
Luz de Borda, aviadora	3,000	.....	43	45
Luz de Borda, aviada	1,000	.....	10	14
San Luis Potosi.				
Concepcion y An	3,000	.....	100	130
El Barreno, aviadora	2,000	2.00	56	54
Sta. Maria de la Paz	2,400	10.00	.....	.....
San Diego y Annexas	2,400	4.00	10	15
Zacatecas.				
Asturiana y An	2,500	.....	50	70
Candelaria y Pinos	2,500	10.00	280	300
Esperanza y An	2,400	.....	50	40
Lourdes	2,500	.....	20	30
Luz de Minillas, pagadoras	2,000	.....	25	30
San Carlos y Annexas	2,500	20.00	175	190
Sta. Maria de Gaud	2,500	10.00	105	115
Miscellaneous.				
Bartolome de Medina	2,000	1.50	75	85
Guadalupe Hacienda	10,000	3.00	250	260
La Luz Hac. (Pachuca)	3,750	.....	295	305
La Reina (Chihuahua)	192	.....	.....	.....
Naica (Chihuahua)	100	.....	6,000	.....
Natividad (Oaxaca) aviadora	1,800	6.00	550	650
Natividad (Oaxaca) aviadas	600	4.00	500	550
San Francisco Hac	6,000	1.00	54	55
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	240	260

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	March. 30.	March. 31.	Name of Company.	March. 30.	March. 31.
Belcher	1.52	.52	Justice	.13	.13
Best & Belcher	2.00	2.00	Mexican	1.10	1.05
Caledonia	2.30	2.30	Occidental Con	.41	.45
Challenge Con	.59	.64	Ophir	1.55	1.55
Chollar	.34	.33	Overman	.45	.45
Confidence	1.35	1.25	Potosi	.25	.24
Con. Cal. & Va	1.55	1.65	Savage	.30	.30
Con. Imperial	.03	.03	Sierra Nevada	.75	.73
Crown Point	.34	.33	Union Con	.94	.93
Gould & Curry	.30	.25	Utah Con	.25	.28
Hale & Norcross	.60	.58	Yellow Jacket	.40	.41

SALT LAKE CITY.* Mar. 27.

Name of Company	Shares.	Par Val	High	Low	Sales.	Name of Company.	Shares.	Par Val	High	Low	Sales.
Ajax	.....	.....	.26½	.26½	200	N. Y. Bonanza	.....	.....	.24¾	.22½	12,700
Boss Tweed	.....	.....	.25	.25	500	Ontario	150,000	100	6.50	6.50	50
California	300,000	$1	.06½	.05½	19,200	Sacramento	1,000,000	5	.27½	.27	18,700
Carisa	500,000	1	.14¾	.13¾	7,200	Silver Shield	.....	.....	.08	.07½	20,100
Century	150,000	1	.58¾	.47	2,700	Star Con	500,000	1	.15¼	.10	12,153
Con. Mercur	1,000,000	5	1.60	1.55	3,750	S Swansea	300,000	1	.21¾	.21	4,800
Daly	.....	.....	3.00	3.00	400	Swansea	.....	.....	.84¾	.84¾	2,000
Daly-Judge	300,000	1	11.25	9.10	3,635	Tetro	.....	.....	.18	.18	200
Daly-West	180,000	20	42.70	41.85	2,125	Uncle Sam, Con	500,000	1	.23½	.23½	200
Grand Central	250,000	1	4.90	4.90	100	Utah	.....	.....	.75	.60	3,552
L. Mammoth	150,000	1	.60	.57½	3,400	Victor	500,000	1	.24½	.24	700
La Reine	.....	.....	.05	.05	1,750	Wabash	.....	.....	.28	.26¾	4,700
M. Washington	.....	.....	.04¾	.04	3,000	Yankee Con	500,000	1	.43	.41¾	900

All mines are in Utah. *By our Special Correspondent. Total sales, 128,812 shares.

ST. LOUIS, MO.* Mar. 28.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.30	$0.60	Columbia Lead, Mo.	$500,000	10	11.00	12.50
Catherine Lead, Mo.	500,000	10	1.50	3.00	Con. Coal, Ill.	500,000	100	21.00	22.00
Central Coal & C	1,875,000	100	86.25	88.50	Doe Run Lead Co.	1,500,000	100	105.00	110.03
Central C. & C., pf.	1,875,000	100	75 00	77 00	Granite Bimet., Mt.	1,000,000	10	.82	.97
Central Lead, Mo	1,000,000	10	130 00	140.00	St Joe Lead, Mo	6,000,000	10	16 00	17.00

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Mar. 25. H.	Mar. 25. L.	Mar. 26. H.	Mar. 26. L.	Mar. 27. H.	Mar. 27. L.	Mar. 28. H.	Mar. 28. L.	Mar. 30. H.	Mar. 30. L.	Mar. 31. H.	Mar. 31. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	.....	.....	8	7¾	.....	.....	8	.....	.....	.....	8	.....	98
Cambria Iron, Pa	50	47½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambria Steel, Pa	50	25	24¾	24⅞	24⅝	24¾	24¼	.....	.....	24⅞	24½	24⅞	24⅝	2,880
Penn. Steel, pfd	100	.....	.....	.....	.....	.....	.....	94	93½	.....	.....	.....	.....	150
Susq. I. & S., Pa	5	2¼	.....	.....	.....	.....	.....	2¼	.....	2¼	2⅛	.....	.....	1,055
United Gas I., Pa	50	109¾	108¾	109	108	108¾	108	108	107⅛	108	107⅝	108	108¾	3,538
Warwick I. & Steel	10	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 7,529 shares.
† Ex-Dividend.

LONDON. March 19.

Name and Country of Company	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date	Quotations. Buyers. £ s. d.	Quotations. Sellers £ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	1 6	Jan., 1903	4 10 0	4 15 0
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	Nov., 1902	6 5 0	6 7 0
Arizona, pref., ord	63,444	1 0 0	5 6	Feb., 1903	8 2 6	8 7 6
Camp Bird, g., Colorado	738,000	1 0 0	0 7½	Mar., 1903	1 8 6	1 9 6
Copiapo, c., Chile	112,500	2 0 0	6 10½	Mar., 1903	2 5 0	2 10 0
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	11 3	13 9
Enterprise, g., British Col	165,000	1 0 0	.....	.....	2 6	7 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 10 0	1 12 8
Frontino & Bolivia, g., Colombia	128,662	1 0 0	3 0	July, 1901	1 18 9	1 1 3
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1899	1 10 0	1 12 6
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	17 6	1 0 0
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	3 6	4 6
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	2 0	2 6
Mountain, c., Cal	250,000	5 0 0	4 0	Nov., 1902	3 7 6	3 12 6
Stratton's Independence, Colorado	1,000,007	1 0 0	6	April, 1902	9 0	10 0
St. John del Rey., g., Brazil	546,265	1 0 0	6	Dec., 1902	17 6	18 6
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	5 15 0	6 5 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	10 0	12 6
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	3 15 0	4 5 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	13 0	May, 1902	3 17 6	4 2 6
Rio Tinto, c., Spain	325,000	5 0 0	27 6	Apr., 1903	52 17 6	53 2 6
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Apr., 1903	6 0 0	6 5 0
Tharsis, c., Spain	625,000	2 0 0	6 0	Apr., 1903	4 15 0	5 0 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,348	1 0 0	1 6	Jan., 1900	2 0 0	2 2 6
Brisbis, Tin, Tasmania	600,000	1 0 0	.....	.....	7 6	8 6
Broken Hill Pr'p., s., N. S. Wales	980,000	8 0	1 0	Feb., 1903	1 13 9	1 18 3
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	15 6	16 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	0 0	Nov., 1902	11 2 6	11 5 0
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 8 9	7 11 3
Great Bo'd'r Pr'p., W. Australia	1,750,000	2 0	6	Mar., 1903	1 1 3	1 1 9
Ivanhoe Gold Corp. W. Australia	200,000	5 0 0	4 0	Jan., 1903	8 16 3	8 18 9
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Apr., 1903	4 6 3	4 8 9
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 16 3	2 18 9
Mt. Lyell M. & R. l., c., Tasmania	275,000	3 0 0	1 0	Jan., 1903	3 8 9	3 11 3
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Mar., 1903	4 2 6	4 7 6
Waihi, g., New Zealand	497,412	1 0 0	2 6	Mar., 1903	5 1 3	5 3 9
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	5 0	Jan., 1903	7 0 0	7 2 6
Mysore Gold, Colar Fields	530,000	10 0	5 0	Mar., 1903	7 0 0	7 2 6
Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 7 6	2 10 0
Ooregum, g., Colar Fields	343,000	10 0	1 3	Dec., 1902	1 16 3	1 18 9
Ooregum, pref., g., Colar Fields	240,000	10 0	1 3	Dec., 1902	2 3 9	2 6 3
African:						
Angelo, g, Transvaal	600,000	1 0 0	6 0	Feb., 1903	7 7 6	7 10 0
Bonanza, g., Transvaal	200,000	1 0 0	12 0	Feb., 1903	5 11 3	5 13 9
British South Africa	4,436,019	1 0 0	rts.	May, 1899	3 3 9	3 6 3
Cape Copper, S. Africa	300,000	2 0 0	8 0	Jan., 1902	3 2 6	3 7 6
Cape Copper, pref., S. Africa	75,000	2 0 0	2 3	Jan., 1903	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 10 0	6 12 6
Crown Reef, g., Transvaal	120,000	1 0 0	11 0	Apr., 1903	17 15 0	18 0 0
De Beers Con., d., pref., Cape Colony	800,000	2 10 0	10 0	Mar., 1903	19 8 9	19 11 3
De Beers Con., def	1,000,000	2 10 0	12 6	Mar., 1903	21 6 3	21 8 9
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May, 1902	8 5 0	8 7 6
Ferreira g., Transvaal	90,000	1 0 0	20 0	Feb., 1903	22 15 0	23 5 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 15 0	6 17 6
Geduld, g, Transvaal	400,000	1 0 0	rts.	Mar., 1902	8 1 3	8 3 9
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 5 0	9 10 0
Jagersfontein, d., Orange F. S.	200,000	5 0 0	6 0	Nov., 1899	26 2 6	26 7 6
Jubilee, g., Transvaal	50,000	1 0 0	bonus.	Aug., 1902	5 10 0	5 15 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	4 0 0	4 5 0
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 3 9	4 6 3
May Con., g., Transvaal	288,750	1 0 0	3 0	Feb., 1903	4 10 0	4 12 6
Meyer & Charlton, g., Transvaal	160,000	1 0 0	3 0	Feb., 1903	5 10 0	5 15 0
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	3 15 0	4 0 0
Princess (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 18 9	4 1 3
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	11 0 0	11 2 6
Robinson, g., Transvaal	750,000	5 0 0	6 0	Feb., 1903	10 15 0	11 0 0
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	5 6 3	5 8 9
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb. 1903	8 17 6	9 2 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 15 0	3 0 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 3 9	1 5 0
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 15 0	8 17 6
Wemmer, Transvaal	80,000	1 0 0	10 0	Jan., 1903	12 15 0	13 5 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Mar. 24. £. s. d.	Mar. 31. £. s. d.	Name of Company	Mar. 24. £. s. d.	Mar. 31. £. s. d.
Anaconda	6 5 0	5 15 0	Johannesburg Invest	3 7 6	3 7 6
British South Africa	3 6 3	3 5 0	Modderfontein	10 16 3	11 1 3
Camp Bird	1 10 6	1 11 0	Rand Mines	10 18 9	11 1 3
Con. Gold-Fields	7 16 3	7 18 9	Rio Tinto com	52 2 6	50 12 6
De Beers Con. def	21 5 9	21 12 6	Simmer & Jack	1 16 3	1 15 0
East Rand	8 13 9	8 6 3	Tomboy	1 18 1¼	2 2 0
Jagersfontein	26 5 0	26 17 6			

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Mar. 11

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. C Fr.
Boleo	Lower Cal	Copper	500	176.00	1,520.00	1,510.00	
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	22.00	22.00
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.60
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	107.00	106.00
Metaux, Cie. Fran. de	France	Metal dealers.	25,000,000	500	22.50	494.00	512.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	472.00	481.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25	.....	0.75	0.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	645.00	684.00

TORONTO, ONT.* Mar. 28.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.07	.04	.....	Granby Smelter	$10	500	450	.....
Cariboo (Mc. K.)	1	.17	.10	.....	Mountain Lion	1	.16	.10	.....
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	.15	.11	.....
Center Star	1	.33	.29	.....	Nova Scotia Steel, com	100	107	100	.....
Crows Nest, C	100	350	300	.....	Payne	1	.22	.18	1,500
Dominion Coal, com	100	112½	118½	125	Rambler Cariboo	1	.35	.25	.....
Dominion S. & I	100	33	29¾	.....	Republic	1	.07	.05	.....
Dominion S. & I., pref.	100	.....	.....	.....	St. Eugene	1	.45	.35	.....
Fairview	1	.05½	.04¾	.....	Virtue	1	.09	.06	.....
Giant	1	.03½	.02	.....	War Eagle Con	1	.18	.10	.....

*Standard Stock and Mining Exchange. Total sales 1,625 shares.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903	Total to Date.	Latest. Date	Amt.
Acacia, g.	Colo.	$1,500,000	1,433,900	$1	$14,339	$59,339	Apr. 1903	.01
Adams, s. l. c.	Colo.	1,500,000	150,000	10		738,500	Oct. 1902	.05
Aetna Con., q.	Cal.	500,000	100,000	5		225,000	Apr. 1900	.15
Alaska-Mexican, g.	Alaska.	1,000,000	180,000	5	18,660	483,381	Jan. 1903	.10
Alaska-Treadwell, g.	Alaska.	5,000,000	200,000	25	75,000	5,195,000	Jan. 1903	.37½
Amalgamated, c.	Mont.	155,000,000	1,538,879	100	769,430	20,426,110	Feb. 1903	.50
Am. Sm. & Ref., pf.	U. S.	50,000,000	500,000	100	1,750,000	10,641,553	Apr. 1903	1.75
Anaconda, c.	Mont.	30,000,000	1,200,000	25		22,050,000	Nov. 1902	.50
Annie Laurie, g.	Utah.	5,000,000	50,000	100	50,000	110,000	Mar. 1903	1.00
Arizona, c.	Ariz.	3,775,000			501,534	3,947,032	Feb. 1903	
Atlantic, c.	Mich.	1,000,000	40,000	25		940,000	Feb. 1901	2.00
Bald Butte, g. s.	Mont.	250,000	240,003	1	60,000	1,357,148	Apr. 1903	.06
Boston & Colo. Sm.	Colo.	750,000	15,000	50		402,450	Oct. 1902	.75
Boston Gold-Copper Sm.	Colo.	1,000,000	1,000,000	1		150,000	Nov. 1901	.02½
Boston & Mont. Con., c. s. g.	Mont.	3,750,000	150,000	25	300,000	27,425,000	Jan. 1903	2.00
Breece, l. s.	Colo.	5,000,000	200,000	25		190,000	Sept. 1902	.05
Bunker Hill & Sullivan.	Idaho	3,000,000	300,000	10	36,000	1,478,000	Apr. 1903	.03
Butte & Boston, c.	Mont.	2,000,000	200,000	10		1,600,000	Nov. 1901	3.00
Butterfly-Terrible, g.	Colo.	1,500,000	1,250,000	1		31,250	Oct. 1901	.00½
C. K. & N, g.	Colo.	1,500,000	1,431,900	1	14,319	28,638	Mar. 1901	.01
Calumet & Hecla, c.	Mich.	2,500,000	100,000	25	500,000	80,350,000	Mar. 1903	5.00
Camp Bird, g.	Colo.	5,000,000	738,000	5	140,700	332,100	Mar. 1903	.15
Carisa g. s. c.	Utah.	500,000	500,000	1		30,000	Nov. 1901	.03
Centennial Eureka, g. s. l. c.	Utah.	5,000,000	100,000	25		2,667,700	Jan. 1902	.50
Center Creek, l. z.	Mo.	1,000,000	100,000	10		80,000	Mar. 1902	.10
Central Eureka, g.	Cal.	4,000,000	388,425	10		23,718	Sept. 1902	.02
Central, l.	Mo.	1,000,000	10,000	100	15,000	340,000	Mar. 1903	.50
Cherry Hill, g.	Cal.	1,000,000	1,000,000	1		47,500	June. 1902	.00½
Chippewa Con., g. s. l.	Colo.	150,000	150,000	1		2,500	Dec. 1902	.00½
Con. Mercur, g.	Utah.	5,000,000	1,000,000	5	120,000	970,000	Apr. 1903	.03
Continental, z. g.	Mo.	550,000	22,000	25		17,600	Oct. 1902	.40
Cripple Creek, g. pf.	Colo.	125,000	125,000	1		45,000	Jan. 1902	.01
Croesus, g.	Cal.	1,000,000	200,000	5		227,300	Aug. 1901	.05
Dalton & Lark, g. s. l.	Utah.	2,500,000	2,500,000	1		350,000	July. 1901	.10
Daly West,	Utah.	3,000,000	180,000	20	432,000	2,491,000	Apr. 1903	90
De Lamar, g. s.	Idaho.	400,000	67,181	5		2,708,091	Oct. 1902	.48
Doctor-Jack Pot Con., g.	Colo.	3,000,000	2,900,000	1		232,000	May. 1901	.01
Doe Run, l.	Mo.	1,500,000	15,000	100	45,000	582,272	Apr. 1903	1.50
Ducktown, c. l. sul. (Ord.)	Tenn.	374,000	74,800	5		165,250	Dec. 1901	.25
Ducktown (Fndr).	Tenn.	1,000	200	5		75,250	May. 1901	75.00
Elkton Con., g.	Colo.	3,000,000	2,500,000	1		1,404,461	Mar. 1902	.04
Empire State-Idaho, l. s.	Idaho.	6,000,000	505,542	10	151,108	1,662,770	Apr. 1903	.05
Free Coinage, g.	Colo.	1,000,000	10,000	100		160,000	Dec. 1902	.20
Gemini.	Utah.	500,000	5,000	100		850,000	Oct. 1902	20.00
Gold Coin of Victor, g.	Colo.	1,000,000	1,000,000	1	10,000	1,230,000	Jan. 1903	.01
Gold King, g.	Colo.	1,000,000	936,850	1		412,214	July. 1901	.03
Golden Argus, g.	Colo.	800,000	8,000	100		2,000	Dec. 1902	.25
Golden Cycle, g.	Colo.	2,000,000	1,500,000	1	112,500	168,750	Mar. 1903	.05
Golden Eagle, g.	Colo.	500,000	489,015	1		98,916	Sept. 1901	.01
Good Hope, g. s.	Colo.	50,000	500	100	12,500	12,500	Jan. 1903	.25
Grand Central, g.	Utah.	250,000	250,000	1	25,000	658,250	Mar. 1903	.10
Gwin, g.	Cal.	1,000,000	100,000	10		426,500	Dec. 1902	.15
Hecla Con., s. l.	Mont.	1,500,000	30,000	50		2,250,000	July. 1901	.50
Homestake, g.	S. D.	21,840,000	218,400	100	163,800	11,375,350	Mar. 1903	2.5
Horn Silver, g. s. c. z. l.	Utah.	10,000,000	400,000	25		5,342,000	Dec. 1901	.10
Independence Con., g.	Colo.	2,500,000	2,500,000	1		281,375	Apr. 1901	.04
Ingham Con., g.	Colo.	750,000	1,359,600	½		33,981	Aug. 1901	.00¾
Iowa, g. s. l.	Colo.	1,666,667	1,666,667	1	33,334	303,503	Apr. 1903	.01
Iron Silver.	Colo.	10,000,000	500,000	20		2,550,000	Dec. 1900	.10
Isabella, g.	Colo.	2,250,000	2,250,000	1		742,500	Mar. 1901	.01
Jamison g.	Cal.	3,900,000	390,000	10	11,700	74,100	Jan. 1903	.03
Katinka, g.	Cal.	1,000,000	1,000,000	1		10,000	Nov. 1901	.01
Kennedy, g.	Cal.	10,000,000	100,000	100		1,801,000	June. 1901	.05
La Fortuna, g.	Ariz.	250,000	250,000	1		1,062,500	Oct. 1902	.05
Last Dollar, g.	Colo.	1,500,000	1,500,000	1	30,000	210,000	Mar. 1903	.02
Liberty Bell, g.	Colo.	700,000	130,349	5	39,104	52,139	Apr. 1903	.15
Lightner, g.	Cal.	125,000	102,255	1	5,113	38,343	Mar. 1903	.05
Lillie, g.	Colo.	1,250,000	250,000	5		349,183	Apr. 1900	.05
Mammoth, g. s. c.	Utah.	10,000,000	400,000	25		1,800,000	July. 1901	.05
Mary McKinney, g.	Colo.	1,000,000	1,000,000	1	60,000	530,000	Apr. 1903	.03
May Day, g.	Utah.	100,000	400,000	¼		30,000	Mar. 1902	.01
Midget, g.	Colo.	1,000,000	1,000,000	1		195,000	Apr. 1902	.15
Mines Co. of America, Fine'l.	U. S.	2,000,000	2,000,000	1	75,000	100,000	Mar. 1903	.01¼
Modoc, g. s.	Colo.	500,000	500,000	1	5,000	255,000	Jan. 1903	.01
Mont. Ore Purchasing.	Mont.	2,500,000	81,000	25	162,000	2,808,000	Jan. 1903	2.00
Mountain, c.	Cal.	6,250,000	250,000	25		3,633,750	Nov. 1902	.98
Mine La Motte, l.	Mo.	3,000,000	300,000	10	60,000	60,000	Jan. 1903	.20
Napa Con., q.	Cal.	700,000	100,000	7		1,180,000	Oct. 1902	.10
National Lead, com.	U. S.	15,000,000	149,054	100		1,341,486	Mar. 1900	1.00
National Lead, pfd.	U. S.	15,000,000	149,040	100	260,820	13,187,708	Mar. 1903	1.75
New idria, q.	Cal.	5,000,000	100,000	5	60,000	460,000	Apr. 1903	.30
New Jersey, z.	U. S.	10,000,000	100,000	100	300,000	5,100,000	Feb. 1903	3.00
New Leadville Home, g.	Colo.	2,000,000	2,000,000	1		265,500	Feb. 1902	.00½
Nugget, g.	Colo.	1,000,000	991,000	1		84,730	July. 1901	.01
Old Colony Zinc & Sm.	Mo.	1,000,000	69,900	10		138,184	Nov. 1901	.25
Ontario, s. l.	Utah.	15,000,000	150,000	100		14,997,000	Dec. 1902	30
Osceola, c.	Mich.	2,500,000	96,150	25		4,247,300	Dec. 1901	3.00
Parrot, c.	Mont.	2,300,000	229,850	10		5,772,925	Jan. 1902	.50
Pioneer, g.	Alaska.	5,000,000	50,000	100		300,000	Dec. 1902	6.00
Plumas Eureka, g.	Cal.	1,406,250	150,625	10		2,831,294	Apr. 1901	.24
Pointer, g.	Colo.	1,250,000	1,250,000	1		25,000	June. 1901	.01
Portland, g.	Colo.	3,000,000	3,000,000	1	90,000	4,387,080	Jan. 1903	.35
Pride of the West.	Ariz.	1,500,000	150,000	10		15,000	Oct. 1902	.10
Quicksilver, pfd.	Cal.	4,300,000	43,000	100		1,909,911	May. 1902	.50
Quincy, c.	Mich.	2,500,000	100,000	25	250,000	13,850,000	Feb. 1903	2.50
Rob Roy, g.	Colo.	15,000	13,725	1	549	915	Jan. 1903	.04
Rocco-Homestake-Nevada, l. s.	Nev.	300,000	240,000	1		90,000	Nov. 1902	.01
Sacramento, g.	Utah.	5,000,000	1,000,000	5	10,000	143,000	Feb. 1903	.00¼
St. Joseph, l.	Mo.	6,000,000	375,000	10	56,250	3,665,750	Mar. 1902	.15
Silver Hill, g. s.	Nev.	180,000	180,000	1	9,000	19,800	Mar. 1903	.05
Silver King, g. s. l.	Utah.	3,000,000	150,000	20	400,000	6,450,000	Apr. 1903	.66⅔
Smuggler, s. l. z.	Colo.	1,000,000	1,000,000	1		2,175,000	Feb. 1902	.01
Spearfish, g. pf.	So. Dak.	1,000,000	882,000	1	26,460	44,150	Mar. 1903	.01
Specie Payment, g.	Colo.	1,000,000	100,000	1		40,190	Oct. 1902	.02
Standard Con., g. s.	Cal.	2,000,000	178,394	10	17,839	4,124,653	Feb. 1903	.10
Standard, s. l.	Idaho.	500,000	500,000	1		2,565,000	Apr. 1902	.05
Stratton's Independence, g.	Colo.	5,500,000	1,000,007	5		3,770,880	Apr. 1902	.12
Swansea, s. l.	Utah.	500,000	100,000	5		330,500	June 1901	.05
Syndicate, g.	Cal.	100,000	100,000	1		82,000	Aug. 1902	.02
Tamarack, c.	Mich.	1,500,000	60,000	25		8,490,000	Dec. 1901	10 00
Tomboy, g. s.	Colo.	1,500,000	300,000	5		1,244,000	July. 1902	.24
Town Topics, g. c.	Colo.	1,000,000	1,000,000	1	5,000	40,000	Mar. 1903	.03½
Trimountain, c.	Mich.	2,500,000	100,000	25	150,000	150,000	Mar. 1903	1.50
Trinity County, g.	Cal.	1,000,000	100,000	10	20,000	20,000	Apr. 1903	.05
Union, g.	Colo.	1,250,000	1,250,000	1		445,244	Jan. 1902	.02
Union, z. l.	Kas.	500,000	300,000	1		18,000	July. 1901	.01
United, c. pf.	Mont.	5,000,000	50,000	100		150,000	Nov. 1902	3.00
United, g.	Colo.	5,000,000	3,994,769	1	40,000	319,933	Jan. 1903	.01
United, z. l. com.	Mo.	5,000,000	78,900	5	7,784	22,961	Apr. 1903	.05
United, z. l. pfd.	Mo.	1,000,000	18,968	25	17,046	99,096	Apr. 1903	.50
United Verde, c.	Ariz.	3,000,000	300,000	10		10,785,322	Dec. 1901	.75
U. S. Red. & Ref., com.	Colo.	6,000,000	59,188	100	118,376	295,942	Apr. 1902	1.00
U. S. Red. & Ref., pf.	Colo.	4,000,000	39,458	100	118,374	354,447	Apr. 1903	1.50
Utah, g.	Utah.	1,000,000	100,000	10	6,000	213,000	Mar. 1903	.02
Utah Con., c.	Utah.	1,500,000	300,000	5	504,000	1,238,000	Jan. 1903	1.68
Vindicator Con., g.	Colo.	1,500,000	1,100,000	1	55,000	972,000	Jan. 1903	.05
Waldorf, g.	Colo.	3,000,000	3,000,000	1		25,000	Dec. 1902	.00½
Wasp No. 2, g.	S. Dak.	500,000	147,900	1		218,410	June. 1902	.00½
White Rock, g.	Nev.	500,000	200,000	2½		2,000	Aug. 1902	01
Wolverine, c.	Mich.	1,500,000	60,000	25	150,000	1,050,000	Apr. 1903	2.50
Yankee Con., g. s. l.	Utah.	500,000	500,000	1		75,000	Apr. 1902	.05
Yellow Aster, g.	Cal.	1,000,000	100,000	10	10,000	483,789	Jan. 1903	.10

NOTE.—These dividends are published gratuitously. Readers are invited to send any corrections or additions which they think necessary to complete our list.

COAL, IRON AND INDUSTRIALS.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Ala. Con., Coal & Iron, pfd.	Ala.	$2,500,000	$24,638	$100	$43,117	$560,529	Mar. 1902	$1.75
Ala. & Ga. Iron, pf.		650,000	6,500	100	$6,500	6,500	Jan. 1903	1.00
Allis-Chalmers, pfd.	U. S.	25,000,000	500,000	100	284,375	1,890,625	Feb. 1903	1.75
Alma Oil	Cal.	400,000	400,000	1	12,000	12,000	Mar. 1903	.03
Altoona Coal & Coke Co.	Pa.	2,500,000	250,000	10		75,000	Jan. 1901	.30
Amer. Agr. Chem., pfd.	U. S.	20,000,000	181,350	100	544,050	4,126,710	Apr. 1903	3.00
American Cement.	Pa.	2,100,000	200,000	10	160,000	540,000	Apr. 1903	.40
American Coal.	Md.	1,500,000	60,000	25	75,000	1,357,500	Mar. 1903	1.25
American Iron & Steel, com.	Pa.	17,000,000	34,000	50		256,100	May. 1902	.15
American Iron & Steel, pfd.	Pa.	3,000,000	60,000	50	75,000	525,000	Apr. 1903	.62½
American Steel Foundries, pfd	U. S.	15,500,000	155,000	100	232,500	465,000	Mar. 1903	1.50
Aztec Oil.	Cal.	250,000	235,000	1	4,700	21,150	Mar. 1903	.03
California Oil & Gas.	Cal.	2,000,000	200,000	10		540,000	Sept. 1901	.70
Cambria Steel	Pa.	50,000,000	900,000	50	675,000	5,775,000	Feb. 1903	.75
Central Coal & Coke, com.	Mo.	5,125,000	51,250	100	153,750	397,500	Apr. 1903	1.50
Central Coal & Coke, pfd.	Mo.	1,875,000	18,750	100	46,874	749,988	Apr. 1903	1.25
Central Oil.	W.Va.	1,500,000	60,000	25		112,500	Aug. 1902	.25
Central Oil.	Cal.	1,000,000	800,000	1		160,247	Jan. 1902	.03
Colorado Fuel & Iron, com.	Colo.	38,000,000	239,310	100		1,642,500	Apr. 1902	1.75
Colorado Fuel & Iron, pfd.	Colo.	2,000,000	20,000	100	80,000	1,560,000	Feb. 1903	4.00
Columbus & Hocking C. & I.	Ohio	7,000,000	69,220	100	34,610	69,220	Mar. 1903	.50
Consolidation Coal.	Md.	10,250,000	102,500	100	205,000	5,728,000	Jan. 1903	2.00
Consolidated Coal.	Ill.	5,000,000	50,000	100		100 000	Jan. 1902	1.00
Crucible Steel, pfd.	U. S.	25,000,000	250,000	100		3,937,500	Dec. 1902	1.75
Empire Steel & Iron, pfd.	U. S.	5,000,000	23,700	100	35,550	355,442	Jan. 1903	1.50
Federal Chem., pfd.	Ky.	1,500,000	15,000	100		90,000	Oct. 1902	1.50
Four Oil.	Cal.	300,000	208,700	1	6,261	33,392	Apr. 1903	.01
General Chem., com.	U. S.	12,500,000	74,103	100	92,629	1,022,650	Mar. 1903	1 25
General Chem., pfd.	U. S.	12,500,000	100,000	100	291,240	2,286,418	Apr. 1903	1.50
George's Creek Coal & Iron	Md.	2,500,000	22,000	100	33,000		Jan. 1903	3 00
Giant Oil.	Cal.	500,000	500,000	1	5,000	5,000	Jan. 1903	.01
Hanford Oil.	Cal.	20,000	2,000	10		13,000	Sept. 1902	1.50
Heywood Oil.	Tex.	800,000	800,000	1	16,000	144,000	Jan. 1903	.02
Higgins Oil.	Tex.	2,500,000	17,600	100		96,850	Apr. 1902	1.50
Home Oil.	Cal.	100,000	100,000	1	22,500	472,500	Mar. 1903	.07½
Homestake Oil.	Cal.	100,000	10,000	10		33,000	Aug. 1902	.15
Houston Oil, pfd.	Tex.	7,500,000	75,000	100	224,125	896,500	Feb. 1903	3.00
Imperial Oil.	Cal.	1,000,000	100,000	100	80,000	340,000	Apr. 1903	.20
Int'l Acheson Graphite, pfd.	N. Y.	500,000	5,000	100	17,500	87,500	Feb. 1903	3 50
Jeff. & Clearf., Coal & Iron, com.	Pa.	1,500,000	15,000	100		105,000	Aug. 1902	5.00
Jeff. & Clearf., Coal & Iron, pfd.	Pa.	1,500,000	15,000	100	37,500	563,060	Feb. 1903	2.50
Lehigh Coal & Nav.	Pa.	14,346,650	286,933	50		20,066,120	Nov. 1902	1.00
Maryland Coal, pfd.	Md.	2,000,000	18,850	100		885,910	Dec. 1902	5.00
Monongahela R. Coal, pfd.	Pa.	10,000,000	98,300	50	347,165	2,777,180	Jan. 1903	3.50
Monte Cristo Oil.	Cal.	500,000	500,000	1	10,000	10,000	Feb. 1903	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	78,750	1,338,750	Feb. 1903	1.75
Ohio & Indiana Natural Gas.	U. S.	10,000,000	90,000	100	90,000	1,170,000	Mar. 1903	1.00
Pacific Coast Borax.	Cal.	2,000,000	19,000	100	57,000	1,274,500	Mar. 1903	3.00
Peerless Oil.	Cal.	1,000,000	92,000	10	40,080	87,360	Apr. 1903	.12
Pennsylvania Salt Mfg.	Pa.	5,000,000	100,000	50	150,000	13,300,000	Apr. 1903	3 00
Penna. Steel.	Pa.	25,000,000	165,000	100		2,025,750	Nov. 1902	3 50
Philadelphia Gas, com.	Pa.	16,102,131	308,542	50	231,406	2,722,613	Feb. 1903	.75
Philadelphia Gas, pfd.	Pa.	3,998,350	212,873	50	99,959	906,108	Mar. 1903	1.25
Pittsburg Coal, pfd.	Pa.	32,000,000	297,012	100	1,039,542	7,276,794	Apr. 1903	1.75
Producers & Con. Oil.	Cal.	1,000,000	10,000	100		56,500	Mar. 1901	.10
Rep. Iron & Steel, pfd.	U. S.	25,000,000	203,569	100	712,492	5,336,786	Apr. 1903	1.75
Retsof Salt	N. Y.	5,000,000	36,030	100	72,000	648,000	Apr. 1903	1.00
San Joaquin Oil.	Cal.	100,000	100,000	1	5,000	65,000	Feb. 1903	.05
Shelby Iron.	Ala.	1,000,000	10,000	100		696,000	Nov. 1902	6.00
Sloss-Sheffield Steel & Iron, pfd.	Ala.	20,000,000	65,085	100	228,000	1,482,000	Apr. 1903	1.75
Standard Oil (of N. J.).	U. S.	100,000,000	970,000	100	19,400,000	183435,000	Mar. 1902	20.00
Susquehanna I. & S., pfd	Pa.	1,500,000	300,000	5	45,000	717,500	Jan. 1903	.15
Temple Iron.	Pa.	240,000	2,400	100	7,200	14,400	Jan. 1903	3.00
Tenn. C. I. & R. R., com.	Tenn.	23,000,000	225,536	100		1,102,144	Nov. 1900	2.00
Tenn. C. I. & R. R., pfd.	Tenn.	248,000	2,480	100	4,960	292,175	Feb. 1903	2.00
Tex. & Pacific Coal.	Tex.	2,000,000	20,000	100	30,000	2,070,000	Jan. 1903	1.50
Thirty-three Oil.	Cal.	500,000	100,000	5	40,000	175,000	Apr. 1903	.10
Thomas Iron.	Pa.	2,500,000	25,000	100		200,000	Aug. 1902	4.00
Tidewater Steel, pfd.	Pa.	600,000	60,000	1	18,000	18,000	Jan. 1903	.30
Union Oil.	Cal.	10,000,000	52,672	100	36,870	334,465	Jan. 1903	.70
U. S. Crude Oil.	Cal.	100,000	100,000	1		27,220	Dec. 1901	.02
U. S. Marble.	Wash.	2,000,000	2,000,000	1		20,000	June 1901	.00¼
U. S. Steel Corp., com.	U. S.	550,000,000	7,085,257	100	5,085,257	27,624,435	Mar. 1903	1.00
U. S. Steel Corp., pfd.	U. S.	550,000,000	5,103,147	100	8,930,497	62,676,123	Feb. 1903	1 75
Va.-Carolina Chem., com.	U. S.	38,000,000	279,844	100	349,805	3,329,064	Mar. 1903	1.25
Va.-Carolina Chem., pfd.	U. S.	12,000,000	120,000	100	480,000	6,540,000	Apr. 1903	2.00
Ventura Con., Oil.	Cal.	1,000,000	1,000,000	1		5,000	Feb. 1902	.00½
Victoria Coal & Coke, com.	W. Va.	150,000	1,500	100		15,000	Jan. 1901	10.00
Victoria Coal & Coke, pfd.	W. Va.	100,000	1,000	100		15,000	July. 1902	3.00
Warner Oil.	Cal.	200,000	200,000	1		10,000	June 1901	.01
Westmoreland Coal.	Pa.	5,000,000	250,000	50	375,000	7,875,000	Apr. 1903	1.50
West Shore Oil.	Cal.	100,000	100,000	1	20,000	65,000	Apr. 1903	.05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par al	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Amistad y Concordia.	Mex.	$480,000	9,000	$50	$18,270	$97,309	Jan. 1903	$2 03
Barreno.	Mex.		2,400		4,468	48,018	Mar. 1903	.75
Bartolome de Medina Mill.	Mex.	50,000	2,000	25	4,620	68,103	Mar. 1903	.77
Cariboo McKinney, g.	B. C.	1,250,000	1,250,000	1		496,837	Mar 1902	.01½
Center Star, g.	B. C.	3,500 000	3,500,000	1		210,000	May 1901	.01
Cinco Senores.	Mex.		2,000		22,930	679,035	Mar. 1903	3.82½
Copiapo, c.	Chile.	1,125,000	112,500	10	39,900	2,866,900	Feb. 1903	.36
Dominion Iron & Steel, pf.	N. S.	5,000,000	50,000	100	175,000	700,000	Apr. 1903	3.50
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	120,000	2,286,000	Apr. 1903	2 00
El Oro, g. s.	Mex.	5,000,000	1,000,000	5		1,886,100	Dec. 1902	.36
Esperanza, s. g.	Mex.	150,000	3,000	50	34,170	1,104,249	Apr. 1903	3.32
Frontino & Bolivia c.	Colom.	643,310	128,662	5		1,211,703	July 1901	.72
Goodenough, s. l.	B. C.	800,000	659,400	1		13,188	Jan. 1902	.01
Greene Con., c.	Mex.	7,200,000	720,000	10	288,000	508,000	Feb. 1903	.20
Guadalupe Mill.	Mex.	1,000,000	10,000	100	23,100	1,508,050	Mar. 1903	.77
Le Roi, g.	B. C.	5,000,000	200,000	25		1,305,000	Nov 1899	1.20
Le Roi No. 2, g.	B. C.	3,000,000	120,000	25		288,000	May 1902	1.20
Mesquital.	Mex.	125,000	250,000	½	15,000	51,458	Feb. 1903	.06
Metallurgical Co., of Torreou.	Mex.	1,500,000	30,000	50	187,500	187,500	Apr. 1903	7.50
Natividad, s. g.	Mex.	36,000	2,400	15	13,008	176,634	Mar. 1903	2.28
N. Y. & Hond. Rosario, s. g.	C. A.	1,500,000	150,000	10	45,000	1,895,000	Mar. 1903	.10
North Star, s. l.	B. C.	1,500,000	1,300,000	1		312,000	Sept. 1902	.01½
Nova Scotia St. & Coal, com.	N. S.	5,000,000	50,000	100		123,600	Apr. 1902	4.00
Nova Scotia St. & Coal, pfd.	N. S.	2,000,000	10,300	100		61,800	Apr. 1902	2.00
Payne Con., s. l.	B. C.	3,000,000	2,000,000	1		1,438,000	Jan. 1901	.03
Penoles (Map.), s. l.	Mex.	125,000	2,500	50	47,825	2,026,114	Jan. 1903	19.13
Providencia (S. J.).	Mex.	90,000	6,000	15	13,860	174,250	Mar. 1903	.77
Rambler-Cariboo, s. l.	B. C.	1,250,000	1,250,000	1		220,000	Nov. 1902	.01
St. John del Rey, g.	Brazil	3,000,000	546,295	5		14,095,995	Dec. 1902	.12
San Carlos Minillas.	Mex.	12,500	2,500	5		234,329	Feb. 1902	4.43
Soledad, s. l.	Mex.	19,200	960	20	5,463	227,704	Mar. 1903	1.90
Sorpressa.	Mex.	19,200	960	20	1,836	187,489	Mar. 1903	1.91
Sta. Maria de Guadalupe.	Mex.	2,500	2,500	1		377,918	Sept. 1902	4.08
Sta. Maria de la Paz.	Mex.		2,400			1,848,273	Dec. 1902	7.05
San Diego de Char.	Mex.	80,000	2,400	40		61,100	Nov. 1901	.33
San Francisco Mill.	Mex.	50,000	6,000	25		284,760	Nov. 1902	.40
Sta. Gertrudis.	Mex.	1,920,000	38,400	50	33,048	2,080,392	Mar. 1903	
San Rafael.	Mex.	60,000	2,400	25	27,300	1,801,368	Mar. 1903	
St. Eugene Con., s. l.	B. C.	3,500,000	3,500,000	1		210,000	Apr 1901	.03
Union Mill.	Mex.	150,000	3,000	50	5,625	389,885	Feb. 1903	1.88
War Eagle Con., g. s. c.	B. C.	2,000,000	1,750,000	1		545,250	Feb. 1900	.01½
Ymir, g.	B. C.	1,000,000	200,000	5		288,000	Mar 1902	.24

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust.Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont., car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01¾@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg.	"	.07

ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06

ALCOHOL—Grain	gal.	2.41@2.43
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50

ALUM—Lump	100 lbs.	1.65
Ground	"	1.70
Porous	"	.80
Chrome, com'l	"	2.75@3.00

ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50

AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½

AMMONIUM—		
Carbonate, lump	"	.07¼
Powdered	"	.08
Muriate	"	.05⅝
Lump	"	.09
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12

ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16

ARSENIC—White powd.	"	.03@.03½
Red	"	.06½@.06¾

ASPHALTUM—		
Ventura, Cal.	sh.ton	$2.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh.ton	35.00
San Valentino (Italian)	lg.ton	16.00
Seyssel (French), mastic	sh.ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾

BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05½

BARIUM	Cust.Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.02

BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
German, gray	"	14.50
Snow white	"	17.00

BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75

BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25

BITUMEN—"B"	"	.03½
"A"	"	.05

BONE ASH	"	.02¼@.02½

BORAX	"	.07¼@.07½

BROMINE—Bulk.	"	.35

CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50

CALCIUM—Acetate, gray	"	1.30
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90

CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.70@1.90
Foreign	"	1.65@2.25
"Rosendale," 300 lbs	"	.75
Slag cement, imported	"	1.65

CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14

CHALK—Lump, bulk	sh.ton	3.25
Ppt. per quality	lb.	.03¾@.06

CHLORINE—Liquid	"	.30
Water	"	.10

CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00

CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.25
Am. best, ex-dock, N. Y.	"	9.25
English, common	"	12.00
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00

COAL TAR PITCH	gal.	.08

COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20

COPPERAS—in bulk	100 lbs.	.42½
In bbls	"	.47½

COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19

CRYOLITE	"	.06½

EXPLOSIVES—		
Blasting powder, A	25 lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock" B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13⅞@.14

FELDSPAR—Ground	sh.ton	8.00@9.00

FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75

FLUORSPAR—		
Am. lump. 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00

FULLER'S EARTH—Lump	100 lbs.	.75
Powdered	"	.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	sh.ton	$8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv.	"	.01@

GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00

INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00

IODINE—Crude	100 lbs.	2.45

IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03

KAOLIN—(See China Clay.)		

KRYOLITH—(See Cryolite.)		

LEAD—Acetate, white	"	.08¼@.08½
Brown	"	.06¼@.06½
Nitrate, com'l	"	.06½
" gran.	"	.08¼

LIME—Com., abt. 250 lbs.	bbl.	.80
Finishing	"	.90

MAGNESITE—Greece.		
Crude (95%)	lg.ton	6.00@6.50
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00

MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.00
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95

MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.30

MARBLE—Flour	sh.ton	6.00@7.00

MERCURY—Bichloride	lb.	.77

MICA—N. Y. gr'nd, coarse.	sh.ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00

MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00

NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21

OILS—Black, reduced 29 gr.: 25@30, cold test	gal.	.11½@.12½
15, cold test	"	.12½@.12¾
Zero	"	.13½@.13¾
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.10¼@.11¾
Dark, filtered	"	.15¼@.17½
Light, filtered	"	.16½@.19
Extra cold test	"	.27½@.31½
Gasoline, 86°@90°	"	.16@.21
Naphtha, crude, 68°@72°	bbl.	11.20
"Stove"	gal.	.14½
Linseed, domestic raw	"	.42@.46
Boiled	"	.48
Calcutta, raw	"	.75

OZOKERITE	lb.	.11½

PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.25
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05⅝@.06
English flake	"	.08¼@.08½
Glassmakers'	"	.07¾@.08½

PAINTS AND COLORS—	Cust.Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01¼@.01½
Orange mineral, Am.	"	.08½@.08¾
Foreign, as to make	"	.08½@.11
Paris green, pure, bulk	"	.12
Red lead, American	"	.06@.06¼
Foreign	"	.06¾@.08
Turpentine, spirits	gal.	.68½@.69
White lead, Am., dry	lb.	.05¼@.05½
American, in oil	"	.06¼@.06¾
Foreign, in oil	"	.06¾@.09½
Zinc, white, Am., ex dry.	"	.04⅝@.04¾
American, red seal	"	.06½
Green seal	"	.07
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.06½@.09½

POTASH		
Caustic, ordinary	"	.04½@.04¾
Elect. (90%)	"	.06¼

POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08¼@.09
Bromide, bulk	"	.22
Carbonate (80@85%)	"	.03½@.04
Chlorate, f.o.b. works	"	.07@.07½
Foreign, f.o.b. N. Y.	"	.07½@.07¼
Chromate	"	.35
Cyanide (98@99%)	"	.20@.20½
Kainit	lg.ton	9.30
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13¼@.13½
Red	"	.34
Sulphate, 90%	100lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41

QUARTZ—(See Silica).		

SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40

SALTPETRE—Crude	100 lbs.	3.40
Refined	"	4.25@4.62½

SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75

SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.31
Oxide	"	.85@1.10

SODIUM—		
Bicarb., ordinary, f.o.b. w'ks	100 lbs	1.12½@1.25
Bichromate	"	1.60
Foreign, f.o.b. N. Y.	"	3.00
Extra domes., f.o.b. w'ks	lb.	.06¼
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.75
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 60@78%, f.o.b. w'ks	"	1.65@1.70
Foreign, f.o.b. N. Y.	"	1.90@2.00
Chlorate, com'l	"	.07¼@.07⅝
Hyposulphite, Am.	100 lbs.	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.10
Shipments	"	1.87½@2.00
Peroxide	lb.	.45
Phosphate	"	.02¼@.02½
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.55
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc.	"	.06
Com'l	"	.01
Sulphate, com'l	100 lb.	82½
Sulphide	lb.	01¼
Sulphite crystals	"	02½

SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15

TALC—N. C., 1st grade	sh.ton	18.00
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	1.25
Italian, best	"	1.62½

TAR—Regular	bbl.	2.35
Oil barrels	"	4.35

TIN—Crystals	lb.	.22
Oxide	"	.45

URANIUM—Oxide	"	2.25@3.00

ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt.	"	.06
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04⅝
Dust	"	.04⅝@.04½
Sulphate	"	.03¼@.03¾

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50

CALCIUM—Tungstate (Scheelite)	"	.60

CERIUM—Nitrate	"	10.00

DIDYMIUM—Nitrate	"	35.00

ERBIUM—Nitrate	"	40.00

GLUCINUM—Nitrate	"	20.00

LANTHANUM—Nitrate	"	30.00

LITHIUM—Nitrate	oz.	.60

STRONTIUM—Nitrate	lb.	.07⅝@.08

THORIUM—Nitrate 49@50%	"	4.50

URANIUM—Nitrate	oz.	.25

YTTRIUM—Nitrate	lb.	40.00

ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.